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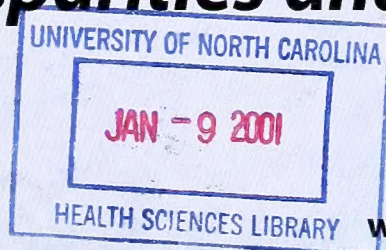
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Volume 62
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North Carolina Medical Journal


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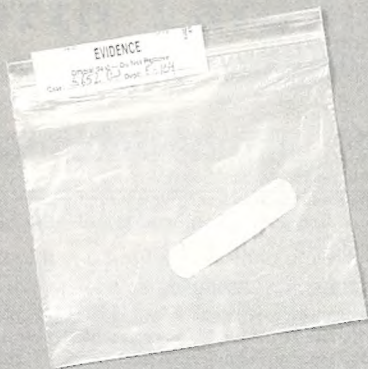


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North Carolina Medical Journal

FOR DOCTORS AND THEIR PATIENTS

January/February 2001, Volume 62, Number 1

Cover: Tin-roof frame houses in a stand of pecan trees are a familiar element of the rural North Carolina landscape, especially in the eastern part of the state, a region with some particular health care problems discussed in this issue. This watercolor is by Bob Blake, for many years a medical illustrator at Duke University Medical Center.

CLINICAL PRACTICE

- 8 Improving Office-Based Preventive Care for Diabetes: The Beneficial Results of a Patient Questionnaire and a Flow Chart

*Todd McDiarmid, MD, M. Lee Chambliss, MD, MSPH, Peter B. Koval, PharmD,
and Shawn Houck, RN-C*

CASE REPORT

- 14 Exercise Program Effects on One Woman with Multiple Sclerosis, Crohn's Disease, Fibromyalgia Syndrome, and Clinical Depression

William B. Karper, EdD

PUBLIC HEALTH

- 19 The Challenge of Eliminating Health Disparities in North Carolina

*Christopher J. Mansfield, PhD, Denise Kirk, MS, Matthew D. Curry, MA,
and Mary Bobbitt-Cooke, MPH*

- 30 2000 Annual Report of the State Health Director

Dennis McBride, MD, MPH

- 39 Addressing Health Professions Shortage Areas in Eastern North Carolina

John Frino, MD

FIRST-PERSON MEDICINE

- 43 Learning the Thunder

Blaine Paxton Hall, PA-C

THE WAY WE WERE

- 45 Climbing Up the Pyramid: My Experience As a Surgical Resident at Duke, 1936-1942

Will C. Sealy, MD

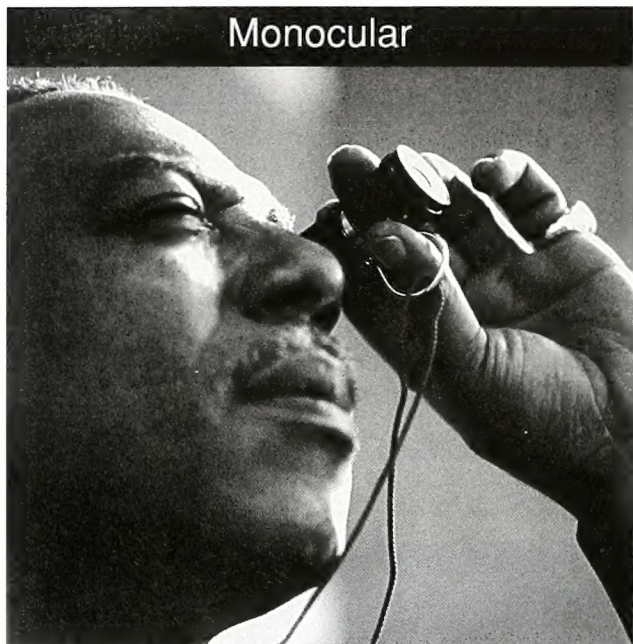
BULLETIN BOARD

- 5 Letters to the Editor
6 Running the Numbers
17 Instructions to Authors
18 NCMS Endorsed Programs

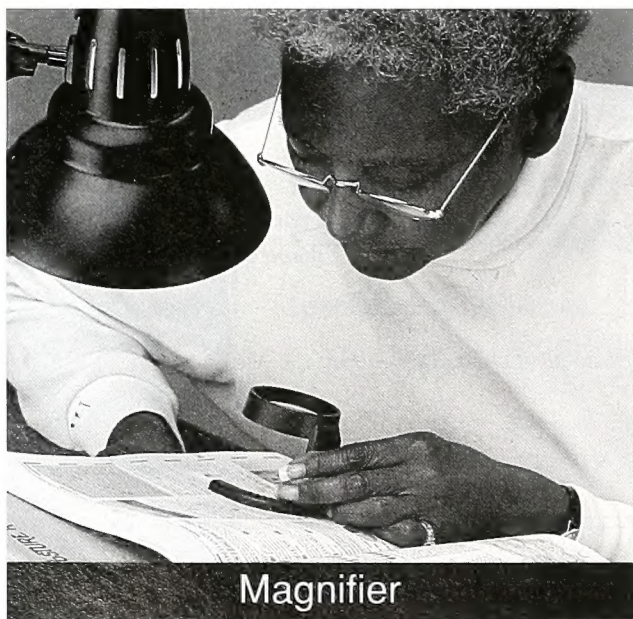
- 52 New Members of the NCMS
54 Classified Advertisements
55 CME Calendar
56 Aphorisms
56 Index of Advertisers

For people who can't see well, here are some things to look into.

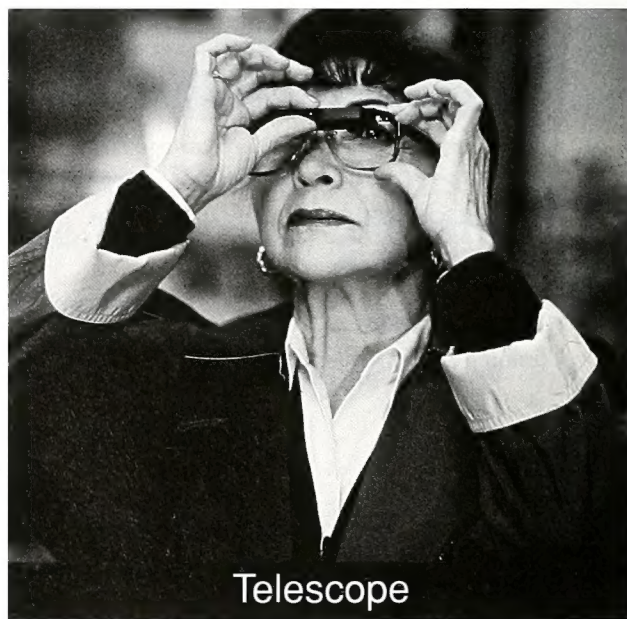
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Letters to the Editor

Punctuality—The Politeness of Kings

To the Editor:

We received a notice from our managed care administrators. The notice said that primary care physicians "must adhere" to certain wait time limits.

Suppose a life-threatening emergency makes me more than an hour late for a scheduled appointment, and the scheduled appointment breaks down in tears and becomes suicidal and I don't get to see the walk-in appointment within two hours? I'm sorry, folks, but things like that go on in my office every day. And if a crisis happens in front of my eyes I can't ask it to wait, so somebody sitting in the waiting room may have to wait. And if I'm willing to stay till 7:00 or 8:00 in the evening to get them all tended to, I don't think anybody should complain because I'm not through by 5:00.

It would be a much more appropriate directive to say that primary care providers should strive to see patients as promptly as possible, hopefully within certain office wait time parameters.

My daddy taught me that punctuality is the politeness of kings, and I do my best to be punctual, but the Lord doesn't always let me. If I was sitting around shooting the breeze and drinking coffee while somebody cooled their heels in the waiting room, that would be another matter. If that's what the HMO guys do while folks are waiting on them, they shouldn't extrapolate their behavior to me.

John R. Dykers, Jr., MD
PO Box 565
Siler City, NC 27344

An Ultimate Board Exam

To the Editor:

A youthful, hospital-based pathologist abruptly declared, in the middle of our morning coffee break, that Blank Memorial Hospital should not sanction any more physicians unless they were specialty boarded. As an unboarded, nongrandfathered, old neurologist, I found several responses sprang to mind:

(1) This could possibly have been a personal attack, but he probably doesn't know that I am a board failure. (2) Perhaps certain boards, e.g., pathology, might be quite simplistic. (3) Are specialty boards more discerning of ability

than IQ tests, class rank in medical school, and the daily observations of a residency director? (4) Is it better to capitulate after one near-pass, or call yourself a success if you pass after the seventh trial? (5) What should we call medical or legal certifieds who then fail to be recertified? (6) Could it be that the losers fade more quickly after age 54, or is there also a loser's egalitarianism.¹ (7) Will these medical "inadequates" be allowed to advertise that "Officially Uncertified" may indicate that the care will be more punctual, more gentle, more thorough, and less expensive? (8) If all the unboarded switched to alternative medicine, so that all residual neurologists were officially boarded, would that lead to the creation of a Superlative Neurology Board category? Who would be the examiners? (9) Most patients know that each brain is uniquely wired, that Einstein was eccentric, that there are diverse explanations for the trailing sine wave of specialty board competence, that a world stocked with identical brains would be predictably stultifying, and that the man perhaps soon to be the most powerful in this world was a poor student at Yale.

More simply put: Uncertified physicians serve a respectable purpose in American medicine. (The young doctor and I finished our coffee and agreed to discuss reasons for his insecurity later.)

Edward V. Spudis, MD
1215 Yorkshire Road
Winston-Salem, NC 27106

¹McNamara JJ. On taking a board exam at age 54. *New Engl J Med* 1995;332:1794-5.

We encourage and welcome letters from our readers. Type and double-space all text, keeping length to under 500 words. Longer letters may be considered for publication as commentaries. We reserve the right to edit and abridge all copy. Send by mail: North Carolina Medical Journal, Box 3910, DUMC, Durham, NC 27710; by fax: 919/286-9219; or by email: nash0004@mc.duke.edu.

Running the Numbers

A Periodic Feature to Inform North Carolina Physicians and Their Patients
About Current Topics in Health Statistics

Paul A. Buescher, PhD, Editor

Reporting Induced Abortions in North Carolina

Given the recent availability of mifepristone (RU-486) as a non-surgical method of abortion, this is an appropriate time to review issues pertaining to the reporting of induced abortions. Such reporting is required by law in North Carolina.

The number of induced abortions in North Carolina has decreased by nearly 20% in the last 10 years, parallel to national trends. In 1999, there were 28,136 induced abortions for North Carolina residents reported to the State Center for Health Statistics. Less than 1% of these 1999 abortions were the result of medical (non-surgical) procedures. Approximately 98% were performed in clinics or doctors' offices, with the vast majority of these performed in fewer than 20 clinics; the remaining 2% were performed in hospitals.

With the increased availability of medical methods of abortion, it is likely that more abortions will be performed outside of a clinic. For abortions performed outside of a hospital, clinic, or other institution, the doctor performing the abortion must prepare and file an *Induced Abortion Case Report*. Regardless of the method of abortion or length of gestation, all completed abortions should be reported to the State Center for Health Statistics. Abortion reports have no names or other patient identifiers; only age, race, marital status, county, and a few other demographic and medical items are reported. The section of the *Induced Abortion Case Report* pertaining to the "procedure that terminated pregnancy" is reproduced below. It is based on guidelines from the Centers for Disease Control and Prevention. Only one of these items is to be checked:

- ☐ 1 = Suction curettage
- ☐ 2 = Medical (nonsurgical) Specify medication(s) _____
- ☐ 3 = Dilation and evacuation
- ☐ 4 = Intra-uterine instillation (saline or prostaglandin)
- ☐ 5 = Sharp curettage (D&C)
- ☐ 6 = Hysterotomy/Hysterectomy
- ☐ 7 = Other (Specify) _____

In North Carolina in 1999, 56% of abortion reports indicated suction curettage as the procedure and 42% indicated dilation and evacuation. In the case of an abortion using RU-486, the second item (Medical) would be checked and then either "RU-486" or "mifepristone" written in the space to the right.

Abortion reports are not permanent records and are used only for statistical purposes. However, complete reporting of abortions is very important if we are to have accurate data on pregnancies in North Carolina and their characteristics. Also, data on abortions helps us to evaluate the effectiveness of family planning programs and programs to prevent unintended pregnancy. Approximately 20% of all reported pregnancies in the state (live births, fetal deaths, abortions) are terminated by induced abortion.

For more information on abortion reporting, for additional statistics on abortions in North Carolina, or for copies of the *Induced Abortion Case Report* with instructions, contact Roy Clark of the State Center for Health Statistics at (919) 715-0265 or roy.clark@ncmail.net.

In July 2000, the Centers for Disease Control published a special supplement of the *Journal of the American Medical Women's Association*. The supplement addresses a variety of issues pertaining to medical abortion, including legal issues relevant to providers. North Carolina requires that an abortion provider become licensed, open its facilities to the state for inspection, and meet detailed requirements (10 NCAC 03E). This journal supplement can be accessed on the Internet at http://www.jamwa.org/vol55/toc55_3.htm.

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Improving Office-Based Preventive Care for Diabetes

The Beneficial Results of a Patient Questionnaire and a Flow Chart

Todd McDiarmid, MD, M. Lee Chambliss, MD, MSPH, Peter B. Koval, PharmD, Shawn Houck, RN-C

The American Diabetes Association (ADA) has proposed guidelines for medical care for patients with diabetes mellitus.¹ These standards call for primary care practitioners to provide a number of preventive care services, but recent studies have shown that primary care physicians comply poorly with some diabetic preventive care recommendations.²⁻⁵

Interventions designed to improve delivery of preventive care have been directed at doctors, at the health care delivery system, and at patients.⁶ These interventions have included use of flow sheets; computer-generated reminders; nurse-initiated reminders; chart audits with feedback; and patient questionnaires. Studies have shown that use of in-office patient questionnaires have improved the delivery of non-diabetic preventive care services,^{7,8} and that flow sheets can improve the delivery of diabetic preventive care.⁹ We found no reports, however, that improved adherence to ADA guidelines could be achieved by combining a patient questionnaire inquiring about adherence to ADA guidelines (see Table 1) with a diabetic care flow chart. So we designed a test of that hypothesis for our family practice clinic.

Methods

Study Setting. The Moses Cone Family Practice Center, the ambulatory clinic of an urban family practice residency program, accumulates over 24,000 office visits a year. The residency has six full-time family practice faculty physicians

and is accredited to train eight residents for each of three postgraduate years. Both resident and faculty physicians participated in this study of patient care. The hospital Institutional Review Board did not require an evaluation of the study.

Subjects. All patients who came for an office visit between January 19, 1998, and January 18, 1999, and who carried a diagnosis of type 2 diabetes mellitus (ICD-9 codes 250.00 and 250.02) were enrolled in the study. The office visit did not have to be focused on diabetes care. Patients who had sensory or cognitive impairment sufficient to interfere with completion of the questionnaire were excluded.

Intervention and Procedure. Our patient education committee developed, pilot-tested, and revised a Diabetes Questionnaire and Reminder sheet (DQR, see Appendix). It contained questions and reminders about ADA-sanctioned continuing care recommendations; it directed the patient's attention to adherence to the schedule of preventive care recommendations and diabetes self-management issues, such as the date of last eye exam, date and value of last hemoglobin A1c level, and estimates of recent blood sugars. The DQR also reminded health care providers to update the diabetic flow chart and to remove the patient's shoes. A conference held prior to the study's inception oriented physicians, nurses, and front office staff to the study and the DQR.

The diabetic care flow chart provides a central location in the patient's chart for recording and tracking the perfor-

The authors are with the Family Practice Residency Program of Moses Cone Health System in Greensboro. Drs. McDiarmid, Chambliss, and Koval are also with the Greensboro Area Health Education Center. Address correspondence to Dr. McDiarmid at Moses Cone Family Practice Center, 1125 N. Church St., Greensboro 27401. Email: todd.mcdiarmid@mosesccone.com

mance of diabetic preventive care services. The flow chart has locations for documenting dates of preventive services such as determination of hemoglobin A1c, proteinuria screening, LDL cholesterol measurement, and eye exam.

We attached a flashing reminder to the computer billing system's check-in screen for all patients with type 2 diabetes. This flashing reminder prompted the front office staff to give study patients the DQR on a clipboard. Patients carried the clipboard from the waiting area to the exam room where they filled out the questionnaire and returned it to the nurse or physician at the start of the consultation. The DQR sheet was discarded at the physician's discretion after the patient's visit; it was not permanently filed in the patient's medical chart.

The DQR reminded the nurse to encourage patients to complete the questionnaire and to ask patients to remove their shoes; it directed physicians and nurses to review the patient's diabetic preventive care status.

An independent change in our practice coincided with the prospective phase of our study: an in-office analyzer was installed, making hemoglobin A1c levels available during the patient visit. Previously, these results had required outside laboratory measurement.

Chart Audit. At the end of the yearlong study, we collected the charts of patients who had been identified as study subjects during the preceding year. A research assistant audited the charts for documentation of diabetic prevention services in two time blocks: (1) the year before the start of our intervention (January 19, 1997-January 18, 1998), and (2) the year following inception of our intervention (January 19, 1998-January 18, 1999). The audit sought evidence of six preventive services (foot exam; inquiry into symptoms of hypoglycemia; annual dilated eye exam; urine screening for microalbuminuria; measurement of LDL cholesterol and hemoglobin A1c levels). Documentations of inquiry into hypoglycemic symptoms and foot exam were located in the progress notes; documentations for hemoglobin A1c, microalbumin and LDL cholesterol testing were located in the diabetes care flow chart or the chart lab reports section;

Table 1. Some ADA recommendations for continuing care of patients with diabetes

Recommended preventive services	Frequency
Inquiry into hypoglycemic symptoms	Each visit
Dilated eye examination	Annually
Glycohemoglobin determination	Twice a year*
Urinalysis for proteinuria	Annually
Lipid profile, fasting	Annually
Foot examination	Annually§

*Applies to patients with stable glycemic control

§ Patients with neuropathy should have feet examined every visit.

Table 2. Medical chart documentation of services before and after intervention

Services recommended for patients with diabetes mellitus	Charts documenting service		
	1/97-1/98	1/98-1/99	p Value*
Office visits with foot exam	28%	41%	<0.001
Office visit with inquiry into hypoglycemia	10%	20%	<0.001
Annual HgbA1c measurement	79%	98%	<0.001
Annual dilated eye exam	30%	40%	<0.01
Annual LDL cholesterol measurement	31%	39%	0.055
Annual urine microalbumin testing	18%	19%	0.91

* By McNemar test (for paired nominal data) or paired t test (for paired interval data)

documentation of referral for dilated eye exam was located in the flow chart, or progress notes, or letters from the consulting ophthalmologists or optometrists.

Results

Two hundred fifty-eight patient charts were audited and their results are included in the results. Sixty-two patient charts were excluded from review because those patients had no office visit in the retrospective study phase. Charts were also excluded for three patients who died during the study. The median age of the study's patients was 58 years. Sixty-six percent of participants were female. Statistical tests for significance were the McNemar test for paired nominal data, and paired t test for paired interval data.

The audit found significant differences in the performance of four of the six services (Table 2). Documentation that foot exam was carried out was found at 28% of visits before and at 41% of visits after intervention ($p<0.001$); documentation of inquiry into hypoglycemic symptoms in-

creased from 10% of charts before to 20% after intervention ($p < 0.001$). Documentation of annual dilated eye exam, LDL cholesterol measurement and microalbumin screening all increased after intervention to reach levels of 40%, 39% and 19%, respectively; only the increase in percentage of patients receiving dilated eye exams reached statistical significance ($p < 0.01$), but the percentage receiving annual LDL cholesterol measurement nearly did ($p = 0.55$). The percentage of patients whose hemoglobin A1c was measured at least once a year rose significantly from 79% to 98%. The mean value for hemoglobin A1c remained virtually the same at 8.0% before and 7.9% after intervention.

Discussion

The combination of a Diabetes Questionnaire and Reminder and a diabetic care flow chart was associated with improved performance of diabetic preventive care services. Foot exam and asking about symptoms of hypoglycemia at each office visit, and the annual performance of a dilated eye exam increased significantly after the combined intervention. The percentage of our diabetic patients having at least one measurement of hemoglobin A1c in a year also improved, almost reaching the theoretical limit of 100% of patients, but the acquisition of an in-office analyzer may have contributed (at least in part) to this improvement. No similar instrumental change can explain the improvement in performance of dilated eye exam, foot exam, and inquiry into hypoglycemic symptoms.

Our intervention did not significantly increase the rate of annual LDL or microalbuminuria screening. However, the increase in the percentage of patients receiving annual LDL measurement nearly achieved statistical significance, and study of a larger cohort may have well have reached statistical significance. Our failure to note an increase in microalbuminuria screening may be a function of our data collection method. We did not exclude patients taking ACE inhibitor or Angiotensin II receptor antagonist drugs. Many of our providers do not screen for microalbuminuria once patients have begun treatment with these agents.

Our delivery of diabetic preventive care was less than fully adequate, but consistent with rates found in other studies of physician performance. In a cross-sectional study of Medicare claims for diabetic preventive care services in three states, Weiner et al² found that 44% of diabetic patients were examined by an ophthalmologist, and 55% had cholesterol tested. Martin, Selby, and Zhang's cross-sectional study of diabetic patients in a staff model HMO found that 21%–37% underwent microalbumin screening.³ Peters et al reported that 44% of diabetic patients in an IPA-type HMO received at least one hemoglobin A1c measurement in a year.⁴

Previous studies have found that patient questionnaires can improve delivery of recommended preventive services.^{7,8,10} We found no previous studies assessing the effect of patient questionnaires on performance of diabetes preventive services, but Ruoff and Gray recently showed that a diabetic flow chart improved adherence to the continuing care service guidelines recommended by the ADA.⁹ Differences in the outcome measures used make it difficult to directly compare our study with that of Ruoff and Gray, but both studies found improvement in diabetic services after introduction of a flow chart.

Both known and unknown factors other than our intervention could have influenced our study's outcome. Installation of an in-office analyzer probably improved on component of care (hemoglobin A1c measurement). It is possible that heightened general attention to standards of diabetes care during the intervention phase may have led physicians to improve their delivery of recommended services, or to improve their documentation of services they had already been providing. The lack of simultaneous controls makes it impossible to unambiguously assign the improved outcomes to our combined intervention. This will require that a large number of individual offices be randomly assigned to the intervention or usual care.

The strength of our study lies in the simplicity of each component of the combined intervention and the ease of integrating each into practice. The paper DQR and flow-chart is neither expensive nor time-consuming to use. Most offices with computerized billing have the ability to identify diabetic patients. Our study enrolled all diabetic patients, whether they came in for diabetes care or another issue, an approach that emphasizes every office visit as an opportunity to engage the diabetic patient in prevent care.

The combined intervention process acts as both a reminder of and a tool for education about recommended diabetic services for all persons involved, including the patient. Our proposition is that asking patients to attend to their own preventive care at the time of an office visits facilitates delivery of these preventive services. Our study shows that the use of a diabetic questionnaire and reminder and a diabetes flow chart in a family practice residency ambulatory clinic is an effective way to improve diabetic preventive care, at least in terms of improved rates of foot exam, dilated eye exam, and inquiry into hypoglycemic symptoms.

Acknowledgments. We thank the office, laboratory, and nursing staff at the Moses Cone Family Practice Center for their support of this study. We also thank Martha Delaney for her assistance with statistical analysis. And, finally, we thank the Moses Cone Health System Research Committee for providing funding for this study.

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Please answer these questions about your Diabetes,

Name: _____ Date: _____ Please circle or check:

What was your last **Glycohemoglobin (diabetes blood test)**?

Level _____ When? Month _____ Year _____ Do Not Know _____

When did you last see an **eye doctor**? Month _____ Year _____ Do Not Know _____

When was your last **flu shot**? Month _____ Year _____ Do Not Know _____

Have you had any **light headed or near fainting spells like low blood sugar** in the last month? Yes No

Do you check your **blood sugar levels at home**? Yes No.

If you do - what are they usually near: 100 150 200 250 300 350 400

How many times a **week** do you **exercise** for at least twenty minutes? 0 1-2 3-4 5-6

Do you follow your **diabetes diet**? Never Sometimes Mostly Always

Would you like to **talk to someone about your**: (check)

Diabetes diet? _____ Diabetes medicines? _____ Diabetes in general? _____

What are your **diabetes medicines**?

Name Dose How often

What **problems** do you have taking your **diabetes medicines**? _____

Please give this sheet to your doctor or nurse

SEE THE BACK OF THIS SHEET FOR MORE DIABETES INFORMATION

PHYSICIAN ONLY:
Checklist Feet ACEI

NURSE ONLY:
Remove Shoes Checklist

Appendix 1 (cont'd). Diabetes Questionnaire and Reminder Sheet

Diabetes Care Tips

To keep your diabetes from causing damage to your eyes or heart or kidneys, you should do the following:

- Have your glycohemoglobin (a blood test that tells how well your blood sugars are controlled) checked every 3-6 months.
- Have a flu shot every fall.
- Have your urine checked every year to look for damage to your kidneys.
- Have your cholesterol checked every 1-2 years.
- Check your feet every night for sores or calluses.
- Exercise regularly. If you want to start exercising, talk with your doctor.
- Eat a healthy diet. If you have questions, ask your doctor.

Appendix 2. Diabetic Care Flow Chart

[illegible]

Diabetes Follow-Up Checklist

[illegible]

Referrals (as often as necessary)					Date	Counseling (as often as necessary)					Date
Pharmacology Consult						Symptoms Sheet					
Diet Counseling						Goals Sheet					
Diabetes Education						Complications Sheet					

Exercise Program Effects on One Woman with Multiple Sclerosis, Crohn's Disease, Fibromyalgia Syndrome, and Clinical Depression

William B. Karper, EdD

I present here the report of a single case to illustrate how an appropriately planned exercise program can help patients with multiple, complex, and chronic medical problems, even (perhaps especially) problems that have a neuromuscular component. I believe that it demonstrates how the addition of a physical activity component to the treatment of even very difficult and complicated cases, like the one described here, can lead to positive outcomes.

The Patient

The patient was a 46-year-old Caucasian woman, married with children; she was a high school graduate, not employed at the time of encounter. She weighed 137 pounds and was 69 inches tall. She had been diagnosed with clinical depression in childhood; with Crohn's disease 12 years ago; with multiple sclerosis seven years ago; and with fibromyalgia syndrome one and one half years ago. She took Prozac daily, interferon beta every three days, and Donnatal, Xanax, and Allegra tablets as needed. She entered a supervised, 18-month-long exercise program for women with fibromyalgia and chronic fatigue. For the first 12 months of the program she attended 86% of the exercise sessions; during the last six months her attendance declined to 68% because of bacterial gastroenteritis, presumably contracted while in Mexico, and

subsequent cholecystectomy. She had no systematic exercise or physical recreation outside of the program.

The Program

Exercise sessions were scheduled three days per week for the first 12 months and five days per week for the last six months. Each session lasted approximately one hour and consisted of mild stretching, followed by walking, followed by weight training with light dumbbells. On certain occasions, she used machine weights in place of dumbbells.

The stretching centered on large muscle groups and was mild and static in nature. Walking usually lasted 30 minutes or more. She was encouraged to walk fast enough that breathing became somewhat labored while talking, or that she developed increased muscular pain or fatigue; she was instructed not to "push through" pain, but to sit and rest for a couple of minutes whenever necessary. Weight training was designed to increase strength of major upper body muscles; 7-10 muscle groups were put through 8-10 repetitions at each session, and the amount of weight used in each hand varied between 1 and 8 pounds. On some days she used two upper body machines and one lower body machine, usually completing three sets of 8-10 repetitions using 10-40 pounds.

Measurements

Vital capacity, peak expiratory flow rate, the respiratory volume forcibly expired in one second, grip strength, muscle strength, walking capacity, and psychological functioning

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(perceived quality of life, perceived stress and depression, pain, fatigue, and mental foggiess) were assessed at the start of the program and 12 and 18 months later. I used semi-structured interviews at the 12- and 18-month points to elicit the patient's perceptions of the program.

Peak expiratory flow rate was measured with a Mini-Wright Peak Flow Meter (Armstrong Industries, Inc.), vital capacity was measured with a hand-held spirometer (J.A. Preston Corp.) and

forced expiratory volume in one second (FEV₁) was measured with a Cosmed Pony Spirometer (Vacumetics, Inc.). Reported scores represent the best of 2-3 measurements made with nostrils sealed shut and the subject standing and bending slightly forward when blowing. Maximum grip strength is reported as the best of three attempts using a Stoelting grip dynamometer while the subject was seated in a chair, the dominant hand lying palm up on the ipsilateral thigh. Muscle strength was also measured by having the seated subject do as many arm curls with a four-pound dumbbell as possible in 30 seconds (adapted from Osness, et al¹). She was closely monitored to assure that she reached full extension and touched her shoulders during each curl; she was not permitted to swing her arms during the extension phase of the curl. Walk capacity was measured by measuring the time to walk one-fourth mile as fast as possible (adapted from Osness, et al¹).

Perceived quality of life was measured with a modified form of the Ferrans and Powers Quality of Life Index (Ferrans²). The subject was asked to grade 34 life situations on a 6-point scale where 1 = no satisfaction and 6 = complete satisfaction; points were totaled to produce an index score (higher numbers denote better perceived quality of life). Perceived stress was measured with the Perceived Stress Scale (Cohen, et al³). The subject used a 5-point scale (ranging 1 = never to 5 = very often) to rank 14 items describing feelings or thoughts experienced over the preceding month. The instrument produces two scores, one being positive if lower, and the other being positive if higher. Depression was measured with the Profile of Mood States

Table. Physiological and psychological response to exercise program

	Months in Exercise Program		
	0	12	18
Minutes to walk ¼ mile	5:09	4:37	4:20
Muscle strength (number of repetitions)	15	21	23
Grip strength (kg)	26	18	31
Vital capacity (cc)	2400	2000	2400
Peak expiratory flow rate (L/min)	500	430	460
Forced expiratory volume in one second (L/min)	1.57	2.04	2.19
Perceived quality of life	133	139	NA*
Perceived stress (positive/negative)	22/12	20/18	20/11
Depression (positive/negative)	46/11	32/14	60/5
Pain	9	7	9
Fatigue	7	7	7
Mental foggiess	5	8	7

*Not available

(McNair et al⁴). The subject was asked to use a 5-point scale (1 = not at all; 5 = extremely) to rank 30 words describing how she had been feeling over the previous week. This instrument also gives two scores, one being positive if lower, and the other being positive if higher.

The subject was asked to rate the perceived average amount of pain, fatigue, and mental foggiess (problems with short term memory, word disorganization, attention, speed of thought, etc.) she had experienced over the preceding month. She used a 10-point scale (1 = severe pain, severe fatigue, or near total cognitive incapacity; 10 = no pain, no fatigue, or being mentally alert).

I considered it important if there were any changes in a positive direction on any fitness, pulmonary function or psychosocial measure. I also considered it important if there were any improvement of at least two points in subjective pain, fatigue and mental foggiess scores. Lexell⁵ has suggested that small negative changes in muscle function produce significant negative effects on overall performance in patients with chronic neurological disorders; logic would imply that the opposite also is true: even small positive effects may produce sizable positive effects on everyday functioning.

Results

The Table shows the effect on all numerical measures. The patient improved in walking capacity, muscle strength, and grip strength. Of the pulmonary function measures, FEV₁ increased and vital capacity stayed the same. Depression

increased, perceived stress remained about the same, and quality of life worsened from pretest to second posttest. In addition, pain and fatigue levels remained unchanged (she never complained much about pain), and mental foggyiness improved.

Discussion

It is important to understand that the program I have described provided more than just exercise, although it emphasized exercise and learning how to become an independent exerciser. The women who participated in the program with the patient provided a lot of emotional and moral support, and shared information about their medical conditions. The author functioned as an educational resource regarding health problems. These circumstances may have had impact on this woman.

This subject benefited from the program. She became more physically fit, and her most debilitating symptoms (fatigue and cognitive problems) remained stable for at least 18 months (previously, her fatigue and cognitive problems had been worsening). Despite her chronic and progressive health problems, program notes show that the amount of weight she was able to lift at each session had increased after 18 months.

The patient said that the program had increased her energy, made her stronger and positively affected activities of daily living (she could more easily pick up heavy objects; open jars, bottles, and cans; carry groceries, etc). These positive results occurred in the midst of a severe crisis in her family life (which may well explain the worsening scores on depression and quality of life scales and the lack of improvement in perceived stress). Still, physical activity, and possibly other program components, helped this patient function better.

Doctors should consider the importance of long term, mild-to-moderate exercise training to help patients with chronic, debilitating health problems. Being able to carry out activities of daily living can help maintain a positive mental state, and this in turn may positively affect compliance with medication and other treatment instructions, and otherwise positively affect the illness course. Appropriate exercise, especially coupled with emotional and social support, can contribute to treatment success. The data shown in the Table suggest that long-term exercise is important, since some measures improved only after more than 12 months of exercise. The key to success appears to be supervised, individualized, mild-to-moderate, long-term physical activity with a social component. My hope is that this report will serve as an example of the value of educating and motivating patients with multiple problems to achieve the benefits of exercise.

Acknowledgments

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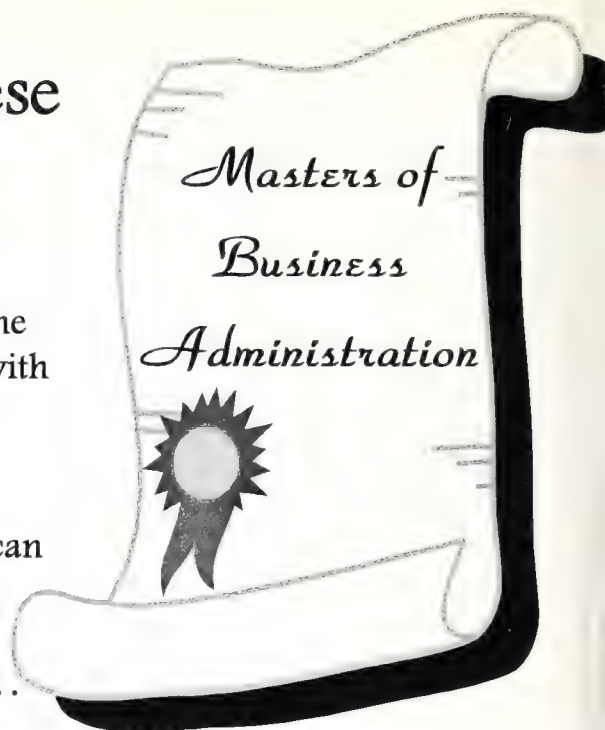
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The Challenge of Eliminating Health Disparities in North Carolina

Christopher J. Mansfield, PhD, Denise Kirk, MS, Matthew D. Curry, MA, Mary Bobbitt-Cooke, MPH

Healthy People 2010 sets a daunting national challenge.¹ This new publication refines, consolidates, and extends the national, 10-year objectives set previously by the US Department of Health and Human Services in *Healthy People 2000*² and the 1979 Surgeon General's Report, *Healthy People*.³ Individual states and many local communities use these national objectives as targets for health improvement. The new national objectives are ambitious, and some targets, such as that for reducing tobacco use, may be unrealistic.⁴ Nevertheless, progress during the last century, and especially during recent decades, suggests that many objectives are within our consolidated reach, if we have the collective will.

Healthy People 2010 is a two-volume document containing 467 objectives organized around 28 focus areas. Most focus areas describe interventions to reduce or eliminate certain chronic and infectious diseases, but they also look at broader issues such as tobacco use, injury prevention, environmental health, improving access to care, and strengthening public health services. Each focus area states a general goal followed by specific and quantifiable objectives that support two overarching objectives: (1) increasing the quality and length of healthy life, and (2) eliminating health disparities. Both objectives present challenges for North Carolina. The average life span in the US increased from 47 to 77 years during the last century,⁵ but North Carolina falls below the national average, ranking 39th among the states in life expectancy⁶ and 40th in years of potential life lost (according to our methodology previously published⁷). In order to achieve a longer life span for all North Carolinians we must also find ways to eliminate disparities, particularly those affecting the leading causes of death because they exert a great effect on longevity of the population as a whole.

In this article, we describe disparities in mortality according to gender, race, and geographic region. We define and analyze three types of disparity, offer caveats about the way disparity is conceptualized, then suggest how the state's healthcare providers, communities, and government can meet the challenge to eliminate or at least diminish them.

Methods and Measurements

Healthy People 2000 called for reducing disparities in health among Americans. The goal for 2010 is "to eliminate them among different segments of the population, including differences that occur by gender, race, ethnicity, education, income, disability, living in rural localities, or sexual orientation."¹(vol. 1, p11) In crafting a strategy for elimination, the first question is how to measure disparate degrees of health among groups of people. The most obvious measure of health is its antithesis—death. Death certificate data are relatively reliable, inexpensive, routinely and efficiently gathered, and provide information on cause of death, race, gender, and county of residence of all decedents. From death certificate data, we can measure and compare mortality rates by race, place, and gender. Other variables that lead to disparity in health are difficult to assess from mortality data, but can be measured by using other health outcomes, or by access to care and use of health services—factors we assume to be related to health outcomes.

From death records maintained by the state of North Carolina, we calculated age-adjusted, cause-specific death rates by race and gender in each county for the period 1979–1998. Rates were age-adjusted to the 2000 US Standard

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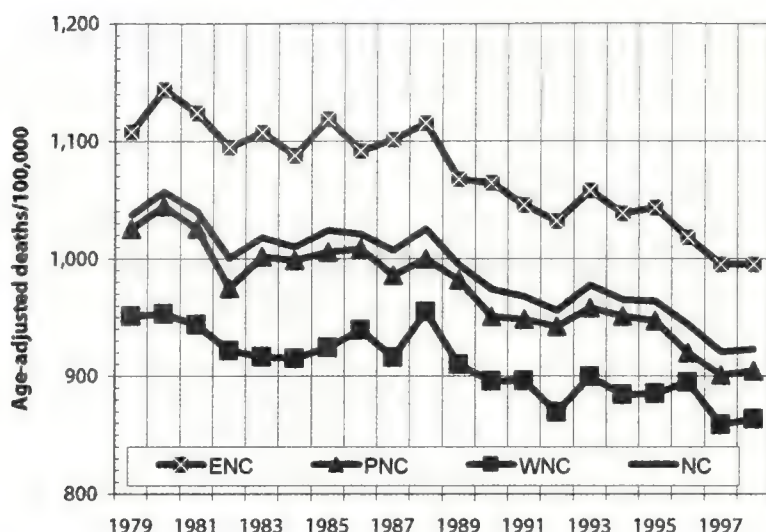


Figure 1. All-cause mortality rate in North Carolina and in the eastern (ENC), piedmont (PNC), and western (WNC) regions of North Carolina.

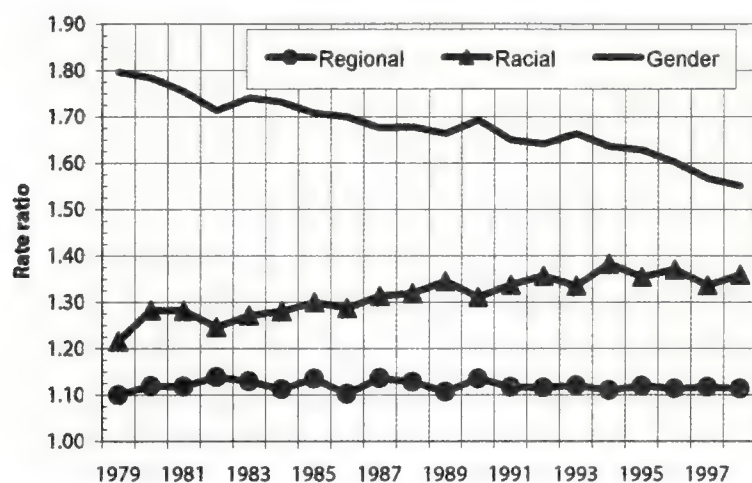


Figure 2. Regional, racial, and gender disparities in all-cause mortality in North Carolina. Regional disparity plots mortality rate in ENC vs. PNC+WNC; racial plots the ratio of Minorities vs. Whites; gender, of men vs. women.

Population. The counties were aggregated into three regions as defined by the State Center for Health Statistics: 24 counties make up the western region; 35, the piedmont; and 41, the eastern region. Age-adjusted rates were plotted for the whole state and the three regions.

Mortality rate ratios for the 20-year period were calculated by region, race, and gender then plotted, using groups with the lower rate as the denominator in each case. Race was dichotomized into White and Minority, the latter including the categories of Black, American Indian, and Other. We first analyzed disparities in total mortality (deaths from any cause), then disparities in deaths due to coronary heart disease (CHD), which accounts for a fifth of all deaths, then briefly looked at deaths due to cancer and stroke. Linear regression was used to fit straight-line trends to data by region, and to project disparity rates to the year 2010.

Results

Disparity in Mortality According to Region, Gender, and Race. Figure 1 shows the clearly decreasing trend in total mortality rate for the state and its three regions. Between 1979 and 1998, there was an 11% decline for the state as a whole (from 1,037 to 923 deaths/100,000 population). The decline was greatest (12%) in counties of the piedmont region (PNC). Decline was least in the mountain region (WNC) but the rate was lowest there from the start. The decline in the eastern region (ENC) was 10% percent, but its starting rate was 10% higher than the rest of the state (1,108 versus 1,007 deaths/100,000). ENC consistently lags behind the other two regions. Figure 2 plots the mortality gap between ENC and the state's other 59 counties as a regional rate ratio. Over 20 years, the average mortality ratio is 1.12, or 12% higher than the rest of the state.

Gender and race disparities in total mortality rate for the state as a whole are also plotted in Figure 2. The male-to-female mortality rate ratio has steadily declined from 1.80 in 1979 to 1.55 in 1998. If the present trend continues, the gender disparity ratio would reach 1.43 by 2010. The racial disparity, on the other hand, increased substantially, from 1.22 in 1979 to 1.36 in 1998, an average annual increase of 0.57% per year. If present trends continue, the disparity will further increase to 1.46 in 2010, meaning that the mortality rate for Minorities would be almost 50% higher than that for Whites.

Coronary Heart Disease. The dimensions of disparity are seen in greater detail when we look at coronary heart disease (CHD). Figure 3 shows 20-year regional trends in the age-adjusted mortality rate for CHD. We have made great progress in reducing deaths due to CHD, but not for all people or regions. Statewide, deaths from CHD declined 43% over the last two decades, but the decline was greatest in PNC (44%) and least in ENC (40%). If the present average rate of annual improvement continues, the western and piedmont regions would meet the *Healthy People 2010* goal of no more than 166 deaths/100,000 by 2005, but ENC would not meet the goal until 2014.

The Table presents CHD mortality data according to region, race and gender in 1979 and 1998, along with the percentage decrease in each category. White men in the WNC and PNC regions had the greatest reduction (50%) in CHD mortality. Minority women in the western region had the least improvement—only 5%. For the state as a whole, the decline for Minorities was 31% compared to 45% for

Whites. Figure 4 shows the statewide trend in CHD mortality rates projected to 2010, when rates for White and Minority women and White men are expected to meet or exceed the *HP2010* target of 166 deaths/100,000. However, Minority men will likely miss the target by more than 40%, and the present racial disparity (death rates 13% higher for Minority men) will increase. Remarkably, the racial disparity in death rates for men began only in 1985 and continues to increase. Projecting present trends to 2010, the Minority men/White men rate ratio for CHD will increase to 1.38. A leveling of the declining trend for CHD might be expected, however.

In regard to gender disparity, the current CHD mortality rate for men is 1.72 times higher than for women. Because the death rate from CHD has decreased faster in men than in women (46% versus 39%), the gender gap is narrowing. If present trends continue, the gender disparity for all races will decline but remain substantial (1.63) in 2010. For Whites, however, the gender rate ratio is projected to become almost equal by 2010.

There is substantial geographic disparity in deaths due to CHD. Those living in WNC have a lower rate than those in PNC who, in turn, have a consistently lower rate than those in ENC. Compared to the rest of the state, the CHD mortality rate in ENC is high and steadily getting higher (from 11% higher in 1979 to 18% higher in 1998). Projecting the trend forward suggests that the disparity in ENC will increase to 21% by 2010.

Because both the regional and racial mortality rates for CHD are increasing, it is useful to examine them in combination (Figure 5). The data fit the linear regression line well for PNC and ENC ($R^2 = 0.84$ and 0.81 respectively) and fairly well for the WNC ($R^2 = 0.47$). The wide fluctuations in rate ratio in WNC are likely due to small numbers of CHD deaths in Minorities, who make up only 6% of the population there. It is clear that racial disparity is presently greater in both PNC and WNC than in ENC, where the greatest proportion of Minorities actually live. This is because the death rate for Whites in ENC is so much higher than in the other two regions (24% higher than in WNC and 19% higher than in PNC). Projecting to 2010 shows that the mortality rate ratio of Minorities to Whites will increase for all three regions, to 1.32 for both the ENC and PNC

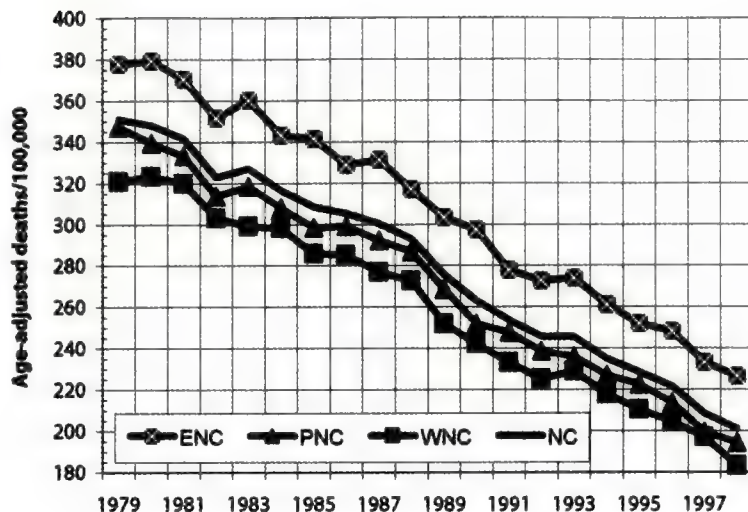


Figure 3. Coronary heart disease mortality in North Carolina and in the eastern (ENC), piedmont (PNC), and western (WNC) regions.

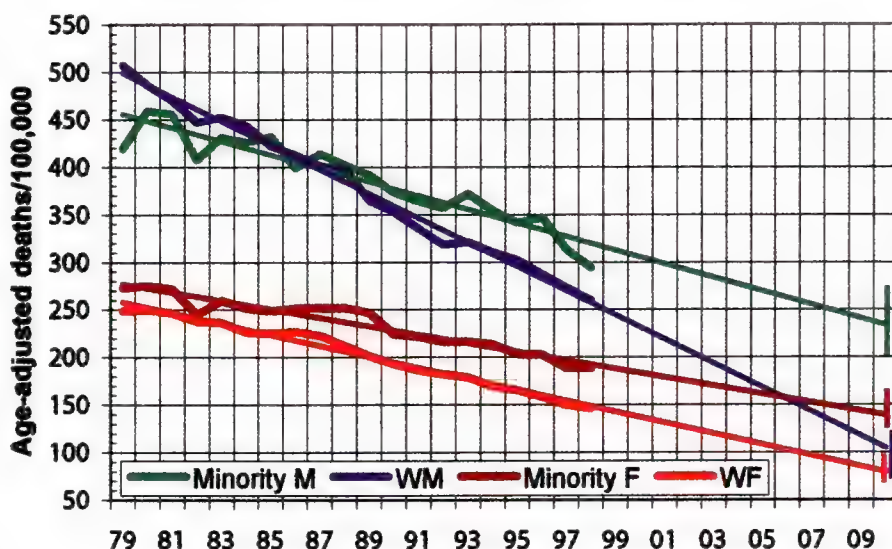


Figure 4. Coronary heart disease mortality for Minority men and women (Minority M, Minority F) and White men and women (WM, WF) in North Carolina. Trend lines show predicted rates to 2010. Vertical bars show 2-standard error estimates at 2010.

(meaning that Minorities there will die of CHD at a rate one third greater than Whites) and to 1.5 in WNC.

Cancer. Space does not allow a graphic or detailed description of mortality from cancer, but we have found that the statewide mortality rate for cancers of all types increased from 190 to 204/100,000 population during the last 20 years. If this trend continues, we will not meet the *HP 2010* target. The regional disparity is substantially smaller for cancer than for CHD; it averaged 1.08 from 1979 to 1998, but is projected to increase to 1.10 by 2010. The racial disparity is substantial, averaging 1.28 over 20 years, and is projected to increase so that the Minority rate will become 1.36 times the White rate. There is a gender disparity in cancer mortality;

Table Mortality Rates* from Coronary Heart Disease in North Carolina in 1979 and 1998

	1979	1998	Decrease
North Carolina			
Total	351.1	201.1	43%
Men	489.1	265.9	46%
Women	254.1	154.7	39%
White	354.9	194.2	45%
Minority	334.8	231.5	31%
White Men	507.4	259.9	49%
Minority Men	419.6	294.3	30%
White Women	248.8	146.7	41%
Minority Women	273.1	188.4	31%
Eastern Counties			
Total	377.6	226.4	40%
Men	505.2	300.9	40%
Women	284.3	174.6	39%
White	397.1	223.6	44%
Minority	336.3	234.5	30%
White Men	545.3	305.0	44%
Minority Men	425.2	294.0	31%
White Women	289.2	166.5	42%
Minority Women	272.5	194.0	29%
Piedmont Counties			
Total	347.3	194.2	44%
Men	483.3	256.9	47%
Women	254.2	150.2	41%
White	349.9	187.3	46%
Minority	335.6	226.9	32%
White Men	500.5	249.2	50%
Minority Men	414.5	296.9	28%
White Women	248.7	143.6	42%
Minority Women	277.3	179.9	35%
Western Counties			
Total	320.9	183.2	43%
Men	479.6	243.0	49%
Women	206.2	137.0	34%
White	321.1	179.6	44%
Minority	317.8	260.5	18%
White Men	483.1	241.1	50%
Minority Men	419.9	283.6	32%
Minority Women	241.5	230.2	5%
White Women	204.3	132.4	35%

*Deaths/100,000 population

men have a higher death rate than women, but this has decreased from 1.8 in 1979 to 1.7 in 1998, and is projected to further decrease to 1.63 by 2010.

Stroke. Unlike the trends in cancer mortality, the trends and projections for stroke are quite promising, although a racial disparity exists and is likely to continue. In North Carolina as a whole, the death rate from stroke decreased from 120 to 76/100,000 between 1979 and 1998. The decrease was similar in all three regions, each of which could meet the *HP 2010* target for stroke (48 deaths/100,000). The linear trend in east-west mortality gap suggests that it will decline to less than a 10% difference. There is a gender disparity, but it, too, is declining, and will probably reach a less than 10% disadvantage for men by 2010. On the other hand, racial disparity in stroke mortality is substantial and increasing. The racial disparity for Minorities grew from 1.18 in 1979 to 1.46 in 1998, and is projected to reach 1.56 in 2010.

Caveats about Race, Gender, and Region

Current and projected trends make elimination of the racial disparity in mortality unlikely. Still, the size and direction of the disparity demand our attention. We believe that public and private actions can and should diminish the disparity, but we offer some cautions before advocacy groups and policymakers set about to craft new initiatives.

Race is one of the most widely used, poorly defined, and misunderstood concepts in public health. It appears as a descriptive and explanatory variable in public health research, often just because the data are so readily available. All too often, however, investigators fail to explicitly define racial categories, to explain why race is relevant to the outcome of interest, or to discuss a biological basis for observed racial differences in health outcomes.⁸ Often the meaning and relevance of terms like "African-American," "Caucasian," and "Hispanic" seem self-evident, and the notion that genetic differences between racial groups account for health disparities is widely accepted, if unproven. Consequently, the validity and usefulness of the concept of race is often taken for granted.

Despite its widespread use, racial categorization must be viewed for what it is—an arbitrary social designation with little biological meaning.⁹ There is no agreement among scientists as to how many racial groups exist or what traits define them.¹⁰ Skin color is commonly used to define the two predominant racial groups in the US ("White" and "Black" or "African American"), but this simple scheme is undermined by ambiguity in culturally accepted and applied definitions of race. In America there is a high degree of genetic admixture (up to 20%) between the two groups, however labeled.¹¹ In fact, there is more genetic variation within racial groups than between them. A classic study by Richard Lewontin revealed

that the genetic makeup of any two people in the world varies, on average, by only 0.2%.¹² Of that variation, 85% occurs within populations, 9% occurs within ethnic subgroups of the same population, and 6% occurs between different races or population groups. This means that race accounts for less than 0.012% of human genetic variation. Since, to date, no data show that any racial group is genetically predisposed to any major cause of morbidity or mortality, it seems improbable that tiny genetic differences between supposed racial groups can account for the large health gaps between Whites and Minorities.¹³

Race may have no biological meaning, but few would deny the social significance of skin color. The use of race in public health research can be justified on the grounds that skin color is a marker for socioeconomic and behavioral risk factors for illness and death that are not captured in vital records. Minorities are less healthy, in part due to their lower economic, educational, and occupational status relative to Whites.¹³ In similar fashion, differences in lifestyle or health behaviors explain some, but not all, of the variation in health outcomes of Whites and Minorities.⁸ Racial disparities in access to, use of, and quality of medical care are part of the problem.¹⁴ It is also possible that racism itself damages health. A growing body of literature indicates that African-Americans/Blacks who experience discrimination are at increased risk for hypertension and a variety of psychological problems.¹⁵ Income is clearly a factor in health, so income inequality may also be.¹⁶⁻¹⁸ More than likely, the poor health of racial minorities in America is due to a combination of interacting factors.¹³

Social class, which accommodates interaction of many factors,¹⁹ may be more important than "race" in understanding the glaring inequities in health between Whites and Minorities. Income, education, culture, and other aspects of social class vary by region. People living in ENC have been less wealthy and less well educated than those in the rest of the state. There are also long-standing regional disparities in availability of and access to health services, but geography, *per se*, does not explain the disparities in health outcomes.

A few final words about gender disparity. Other than obviously gender-specific diseases, like cancers of the reproductive organs, gender disparity may have less to do with biological factors than with structured gender roles, health behaviors, occupational exposures over a lifetime, and social factors related to use of health services.

Responding to the Challenges

How should the people and health systems of North Carolina respond to disparities in health status? There are a

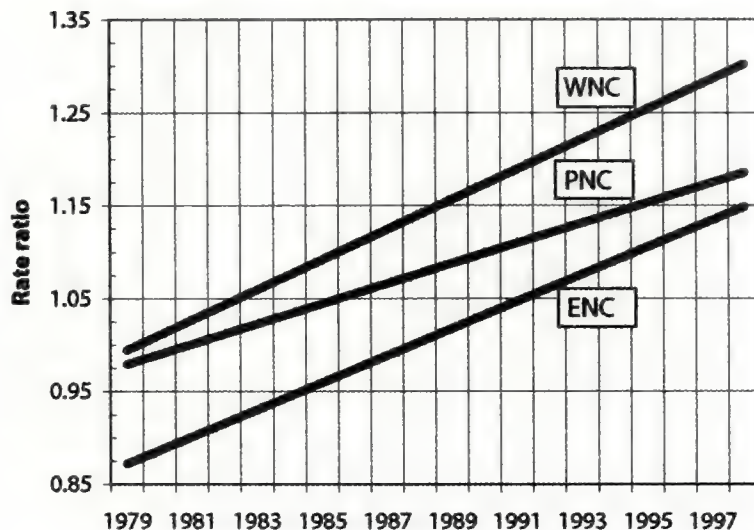


Figure 5. Racial disparity (Minority vs. White) in coronary heart disease mortality ratio in eastern (ENC), piedmont (PNC), and western (WNC) NC.

number of possible actions available in the public policy arena, in the health system, in medical education, and in the community. Gender differences, while present, are declining, but those related to race are increasing, and the slope of their increase makes the hope of eliminating them faint, at best. The first step is to acknowledge the South's long history of racial discrimination. We should seek to eliminate any vestiges of discrimination in personal or institutional attitudes and behaviors. Even so, racial disparities in health will not easily be reduced or eliminated, because they may reflect accrued social disadvantage or the cumulative effect of a lifetime of unhealthy behaviors. A first order response would be to show policy makers, citizens, and health care providers the magnitude and direction of the racial disparity in death from preventable and treatable diseases. It is our hope that the trends and projections reported here will serve to educate and to encourage further analysis, discussion, and action.

In 1999, Governor Hunt appointed a Task Force for Healthy Carolinians. One of its responsibilities was to develop 2010 health objectives for North Carolina and to address Governor Hunt's challenge to "eliminate health disparities among the disadvantaged." The Governor's Task Force submitted its report in October 2000.²⁰ Like *Healthy People 2010*, each objective for North Carolina addresses disparities, and presents the data available on incidence of disease, risk behavior, disability, or mortality by race/ethnicity, age, gender, education/income, and geographic location. Many of the objectives call for policy changes. For example, the focus area entitled *Access to Health Care* challenges North Carolina policy makers to increase the ratio of primary health care providers to population in all areas of North Carolina; to increase the number of practicing doctors of minority and ethnic background; to increase the number of dentists who

accept Medicaid payments; and to increase availability of medications for Medicare and Medicaid recipients.

Health insurance is addressed in two objectives calling for coverage of all North Carolinians, children and adults, by 2010. Expanding financial access to health care is a logical place for public policy discussions to start. Nearly one in six North Carolinians has no health insurance; among Minorities, one in five has none. Health insurance coverage for poor children and their parents will reduce disparity in access. Assuring access to medical care for the young promises to reduce disease, disability, and health care cost in later life. As well as increasing financial access to care, public policy could encourage more equitable distribution of health care and other social resources by favoring areas where the disparities are greatest. State government could use case-mix adjustments in Medicaid reimbursement to recognize the disparate health status and extra cost of care in certain populations.

A number of public health initiatives will arise in response to North Carolina's 2010 Health Objectives. Those that improve health behaviors of Minorities, and men in particular, should receive high priority. The necessary community participation and leadership can be facilitated by tracking progress at the community level and by collaborating with the medical care system, which, although largely private, has public responsibilities and is therefore challenged to improve disparities. Medical doctors and other healthcare providers can be public advocates for change, or they may simply take personal responsibility at an individual and local level. Hospitals and health systems, particularly those with public mandates, have key roles to play. There are a number of models of how they can use their managerial capacities to create new local and state partnerships and pathways for care. Pitt County Memorial Hospital is collaborating with community-based clinics, the local medical society, the Brody School of Medicine at East Carolina University, the NC Office of Rural Health, and the federal Health Resources and Services Administration to enroll the medically indigent in a pro bono, managed care program based on a similar program developed by the Buncombe County Medical Society.

Providers can also address disparities as a quality-of-care issue, as Fiscella et al recommend.¹⁴ Investment in new services should be based on medical needs of populations, with particular attention to needs of specific groups so that they will receive the recommended clinical preventive services and an equal standard of care. Data systems for quality improvement and case management should collect and use information on race and gender.

Medical schools also must embrace disparity issues. Disparity was the theme of last year's meeting of the American Association of Medical Colleges, and recent medicine and public health initiatives stimulate schools to expand their biomedical teaching to include material on population health and forming partnerships with communities.

Good health is promoted where people live, work, learn, play, and worship. Communities that organize and mobilize around a common health agenda can make significant healthy changes in their social and physical environments. For example, programs to decrease the incidence of heart disease and stroke should be the responsibility of the community as well as of healthcare providers. Through collaborative, multicultural efforts, communities can make schools and worksites smoke-free, can improve recreation facilities that promote physical activity, and can promote restaurants, schools, and worksites that offer healthy and nutritious menus that are appropriate and appealing to all.

In North Carolina, 54 counties have been certified by the Governor's Task Force as having Healthy Carolinians Task Forces, and 32 more are working towards this goal. Certification indicates that the county has established a community-based task force, whose members reflect the demographic make-up of the county and include public health, hospitals, healthcare providers, schools, businesses, churches, civic groups, health and human service non-profits, community members and elected officials. These Task Forces determine the health agenda for the county and mobilize resources to address their priorities. They use the 2010 Health Objectives to guide policy changes, formulate new or enhanced programs, and to change the environment so that it will promote health and decrease premature death and disability.

The data we report here show an encouraging reduction in the mortality rates for the North Carolina population as a whole. The trends in gender disparity for heart disease and stroke are headed in the right direction but are still much too large. Gender disparity in cancer is substantial and declining only slightly. Gender disparity in mortality from other diseases and trauma requires further scrutiny. Still troublesome are the disparities in mortality for race and region; we doubt that all of these can be eliminated by 2010. The regional disparity is stubbornly persistent and the racial disparity is widening. We hope the trend for both will bend.

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2000 Annual Report of the State Health Director

Dennis McBride, MD, MPH

Dr. McBride is State Health Director/Assistant Secretary for Health, NC Dept. of Health and Human Services. This article is adapted from his address to the November 2000 annual meeting of the North Carolina Medical Society in Greensboro.

Retooling Public Health

North Carolina's public health programs are being upgraded for the 21st century. The Section of Communicable Disease and Epidemiology will be reconfigured as the Section of Human Ecology and Epidemiology (SHEE), charged "to reduce human morbidity and mortality through the prevention, detection, analysis, and control of health risks within an interdependent ecologic system." Within SHEE, the State Center for Health Statistics (renamed The State Center for Health Informatics and Statistics) will reevaluate the operation of its Vital Records Branch and Geographic Information Service Unit. A new Office of Epidemiology will coordinate the public health response to three emerging issues: bioterrorism, human genomics, and health surveillance data. This office will also promote opportunities and linkages within and between multiple state agencies that use epidemiology as a discipline.

Human Ecology and Social Epidemiology. Public health planners are just beginning to understand fully the importance of human ecology (the relationship between human health and global environmental change) and social epidemiology (which combines sociology, psychology, political science, economics, demography, and biology to examine the social distribution and social determinants of health). These emerging sciences will allow us to address complex and persistent challenges in health disparities, gene and environmental interactions, global environmental changes, catastrophes, and other environmental health issues.

Natural Medicine Initiative. In light of growing consumer interest in the use of vitamin and mineral supplements,

herbals, and other natural medicines, the Division of Public Health has formed a work group to assist in establishing a new "Office of Natural Medicine." Chaired by Dr. David Bruton, Secretary, NC Department of Health and Human Services, the 30-member work group includes Dr. Kathy Connor (Duke University Medical Center), Dr. Bruce Hathaway (Brody School of Medicine, East Carolina University), Dr. Gregory Burke (Wake Forest University School of Medicine), Drs. Joe and Terry Graedon ("The People's Pharmacy," National Public Radio), Dr. Lenore Arab (UNC School of Public Health), Dr. George Nemecz (Campbell University School of Pharmacy), Dr. Kuo-Hsiung Lee (Director of Natural Products Laboratory at UNC School of Pharmacy), and researchers from the Department of Agriculture, NC State University, and Blue Cross Blue Shield of North Carolina. The office will obtain data to ensure that, prior to marketing, medical products are safe to use, of good quality, and adequately absorbed by the body. The office will educate the public about use and availability of natural medicines.

Health Disparities

During the past year, the Division of Public Health and the Governor's Task Force for Healthy Carolinians have developed North Carolina's *Health Objectives for 2010*, which focuses on eliminating health disparities. North Carolinians from minority populations experience disproportionately high rates of infant mortality, cancer, diabetes, homicide, AIDS, heart disease, stroke, neural tube defects, chronic obstructive pulmonary disease, and communicable disease. (See Figures 1-6.) Eliminating these inequities across the

state must be a top priority. Two major challenges will receive particular attention: (1) race-based decision-making in the delivery of health care and (2) the lack of minorities in public health and health care professions. We are working with the historically black colleges and universities to bring more minority students into the health field.

Two recent conferences have focused on health disparities. The Department of Health and Human Services, in partnership with the NC Institute for Public Health (part of the UNC School of Public Health), recently hosted a statewide Health Disparity Conference, titled "The Great Divide – Understanding and Eliminating Health Disparities." Local, state, and national leaders met with stakeholders from agencies, health care systems, communities, and business to encourage their involvement in creating solutions to the health care gap. Last September, the Division of Public Health and the NC Association of Black County Officials convened an African-American Health Summit, titled "People, Policy and Prevention: Setting A Health Agenda," at Winston-Salem State University. About 75 elected or appointed state, county, and municipal leaders focused on ways to improve access to new and existing resources, and on environmental conditions. The participants committed themselves to "zero tolerance" for health disparities in North Carolina.

School Health Program

School Nurses. The national standard specifies one school nurse per 750 students; in North Carolina the ratio is one per 2,200 students. This is unacceptable. We need to educate the public on the importance of school nurses. The days when scrapes and bruises were the main health concerns at school are long gone. Nowadays, schools serve children with complex medical conditions that were seldom if ever encountered earlier. Students may require tube feeding, catheterization, nebulizer treatments, and the like. More children take more medications than in the past. When there is no school nurse on site, it is difficult to ensure that the right children get the right medications. A child who misses school because of an asthma attack that could have been prevented by nursing care is being unnecessarily penalized, and his or her educational achievement compromised. One of the reasons for the gap in school achievement between advantaged and disadvantaged children is that disadvantaged children have more chronic health problems, are less ready to learn, and miss more school. A trained school nurse can level the playing field for children with chronic illnesses.

School nurses have an important role in assuring that schools have a good disaster-preparedness plan; they can raise faculty awareness about health issues; they can help

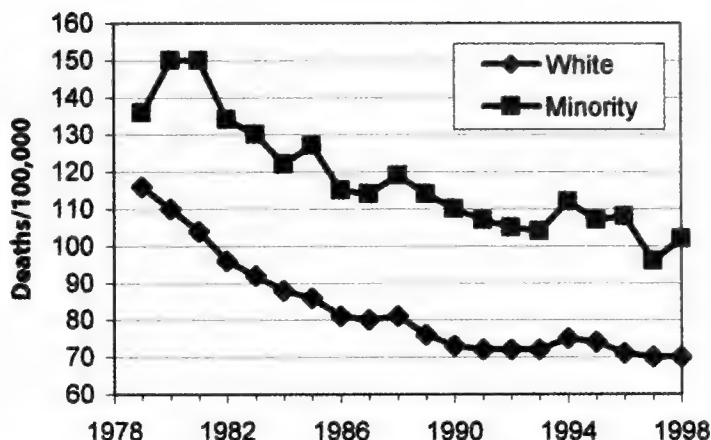


Figure 1. Age-adjusted rates of death due to cerebrovascular disease in North Carolina.

teachers improve the health curriculum and encourage more fitness activities; and they can provide links to the local medical community. School health programs are not in competition with educational objectives; on the contrary, they are an essential component of a sound educational program. Our two-year goal is to have one nurse per 1,500 students; eventually we will reach the national standard of one to 750, or a nurse in every school.

Early Childhood Education. The role of preventive health in early childhood education is under-appreciated. Preschool environments must be safe, healthy, and nurturing if they are to reduce the considerable health risk faced by their young students. Childcare staff must be well-trained in preventive health care practices like proper infant sleep positioning, emergency response, identifying child abuse or delayed development, and care of children with special needs. Health professionals, local health departments, and community health centers should serve as consultants and advisors to daycare operations, and the daycare system should provide adequate resources for these professional health services.

Asthma

During the 1999/2000 school year, the Division of Public Health studied more than 130,000 7th and 8th graders from 498 public schools to obtain accurate school- and county-specific data on the prevalence of asthma, barriers to care, use of health care services, exposure to environmental triggers, racial and regional disparities, and functional costs associated with asthma. The survey results will be released at the Asthma Summit on January 9, 2001, when local coalition members will interact with intervention experts to obtain help in disseminating data and implementing change. The Division of Public Health and the NC Medical Society are working with the Asthma Alliance of North Carolina

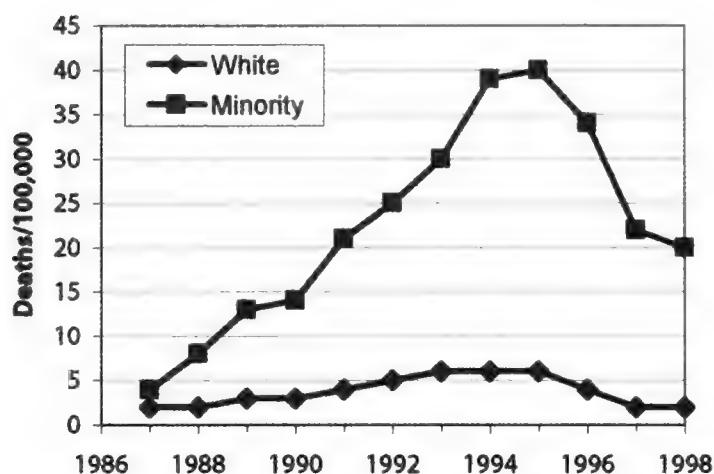


Figure 2. Age-adjusted rates of death due to AIDS in North Carolina.

(AANC), a statewide partnership of local and state government agencies, academic institutions, local asthma coalitions, non-profit associations, professional associations, and private industry. The AANC's mission is to reduce the burden of asthma for all people in the state through a comprehensive public health approach.

Funding Asthma Coalitions. More than half the counties in the state have some type of community collaborative asthma effort, and all recognize this disease as a serious childhood problem. Using \$250,000 allocated by the North Carolina General Assembly, the Division of Public Health will make grants of \$9,000 in "seed money" for local asthma initiatives to 15 communities that do not have collaborative efforts or are in the initial stages of addressing asthma. Five communities with established asthma coalitions will receive \$23,000 each to support childhood asthma management and control.

Asthma Environmental Intervention Study. A four-county asthma environmental intervention study, sponsored by the Section for Human Ecology and Epidemiology and the UNC School of Public Health, sent local environmental health specialists to evaluate the homes of 96 asthmatic children. They made recommendations for controlling asthma triggers and provided intervention materials and services including mattress covers, vacuum cleaners, and professional cleaning services. Evaluations of respiratory function made during the intervention will measure the effectiveness of the interventions. The study will serve as a model for a referral program for physicians of asthmatic patients.

Tobacco Money and Tobacco Initiatives

One of the biggest new resources for healthcare funding is the \$4.6 billion tobacco settlement. The General Assembly has

put 25 % of those funds in a health trust. With \$50 million dollars already allocated, it will be the largest foundation in North Carolina funding health initiatives, and one of the largest in the country. A Health Trust Commission created by the Governor and the Speaker of the House and Senate Pro Tempore will decide on the projects to be funded.

A separate national foundation established by the master settlement agreement will give the Division of Public Health \$750,000 annually for three years to reduce teen tobacco use through youth empowerment. We are working to secure the required 1:1 in matching funds, which will also be a first for North Carolina. In a third, related initiative, the Division won a \$1.9 million Robert Wood Johnson grant to develop three teen tobacco use prevention centers in Wilmington, Durham and Asheville. About 38% of NC youths use tobacco,

which exceeds the national rate; we are aggressively pursuing every opportunity to prevent children from starting to use tobacco and to help them stop. Governor Hunt has kicked off a "Too Cool to Smoke or Spit" campaign in the schools, calling on all campuses to go tobacco-free.

Stroke Prevention Task Force and Summit

North Carolina's leadership position in cardiovascular health programs has been emulated by other states. Thanks in large part to the Heart Disease and Stroke Prevention Task Force (chaired by Senator Ed Warren with Dr. Donald Ensley, head of the Department of Community Health at ECU as vice-chair), ours is one of the first two states in the nation to be awarded comprehensive funding from the Centers for Disease Control and Prevention (CDC) for a Cardiovascular Health Program. This program focuses on increasing physical activity and improving nutrition, and is unique in getting fully half of its funds to the local level.

In 1999, the Task Force, along with the State Health Officers of North and South Carolina and Georgia, sponsored a Tri-State Stroke Summit to examine the extraordinarily high rate of stroke deaths in the eastern counties of the three states. With CDC funding, the Tri-State Stroke Network will develop a "white paper" on stroke in the Stroke Belt "Buckle."

HIV/STD Prevention, Control, and Treatment

Prenatal HIV Testing. The Division of Public Health will advocate to the Commission for Health Services a rule change to require prenatal HIV testing. We want to ensure that informed consent is obtained, every woman is tested for

HIV (unless she refuses), and that all are counseled about HIV infection as early as possible.

AIDS Drug Assistance Program. North Carolina's AIDS Drug Assistance Program (ADAP) is designed to help qualified HIV-infected persons purchase HIV medications. However, the North Carolina ADAP eligibility criterion is currently set at 125% of the federal poverty level (for a single person, this means an income of \$10,437.50). This is the lowest level in the nation; as a result, many low-income North Carolinians in need of life-sustaining medications cannot obtain these very costly drugs. We need to align ourselves with other states where eligibility begins at 150%-500% of poverty level; in Georgia, Tennessee, South Carolina, and Virginia, it is 300%.

Mental Health Services for HIV-Positive Citizens.

Some persons with HIV/AIDS have difficulty obtaining much-needed mental health and substance abuse services. Public Health's HIV/STD Prevention and Care Branch is working with the Medicaid Program and Division of Mental Health to assess the extent to which persons diagnosed with HIV/AIDS are being served or not served by local and regional agencies.

HIV/STD in Public Education. All adolescents must get accurate and balanced information on abstinence, contraception, and the prevention of sexually transmitted diseases, including HIV. I am very concerned about confusion concerning the "abstinence until marriage" law and teaching about contraception and prevention of sexually transmitted diseases. Many schools are reportedly not teaching the Healthful Living Curriculum as written, especially the section on contraception, STDs, and HIV. The chief recommendation of the Comprehensive Child Health Plan was that the mandatory school health curriculum be expanded and "the State Board of Education . . . monitor each school system to ensure that the curriculum is being taught and that children in the school understand and adopt these healthful living behaviors." Please work with your local school systems to ensure that our adolescents have access to information that can save their lives.

Needle Exchange. Previous efforts to amend state law to permit needle exchange programs have failed, but the issue remains one of great importance because 40-50% of all new HIV infections are associated with drug use. Virtually all national and state medical and public health leaders agree that needle exchange slows the spread of HIV and other blood-borne infectious diseases. A comprehensive needle exchange plan also helps injecting drug users reduce their high-risk behaviors, facilitates enrollment in drug treatment programs, keeps discarded needles and syringes off the

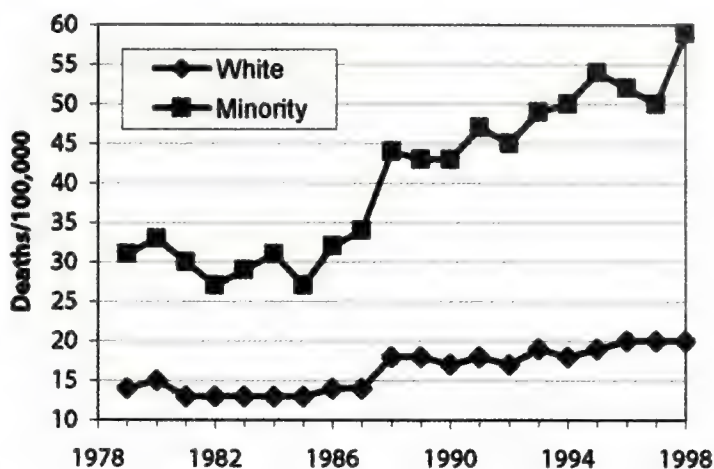


Figure 3. Age-adjusted rates of death due to diabetes mellitus in North Carolina.

streets, and reduces societal costs of treating transmissible diseases.

Syphilis Elimination. In 1999, North Carolina ranked fourth nationally in number of primary and secondary syphilis cases; unfortunately, in 2000 North Carolina has risen to second place! We have targeted syphilis elimination efforts in eight high-incidence counties (Alamance, Durham, Forsyth, Guilford, Mecklenburg, Orange, Robeson, and Wake). As part of the CDC's Comprehensive STD Prevention System, North Carolina received \$902,500 for syphilis elimination in 2000, and we expect another \$69,500. With the American Social Health Association, we have begun a statewide promotional/educational campaign. Rapid ethnographic community assessments (RECAPs) have been carried out in seven counties to identify behavioral risk factors; assess knowledge, attitudes, and beliefs pertaining to syphilis; and ascertain the level of knowledge of, and satisfaction with, county health department STD services.

Immunization

Rubella Outbreak. Since March 1, 2000, there have been 95 cases of rubella in North Carolina, already exceeding our 1996 record of 87 cases. The outbreak is concentrated in under-immunized immigrants, mostly from Central and South America. Within the past six months, the Immunization Branch has shipped more than 93,000 doses of measles, mumps, and rubella (MMR) vaccine at a cost of more than \$1 million.

To coordinate effective and culturally sensitive rubella outreach, we have designated a Rubella Outreach Coordinator to facilitate relationships between local health providers, the Hispanic/Latino communities, and local business and

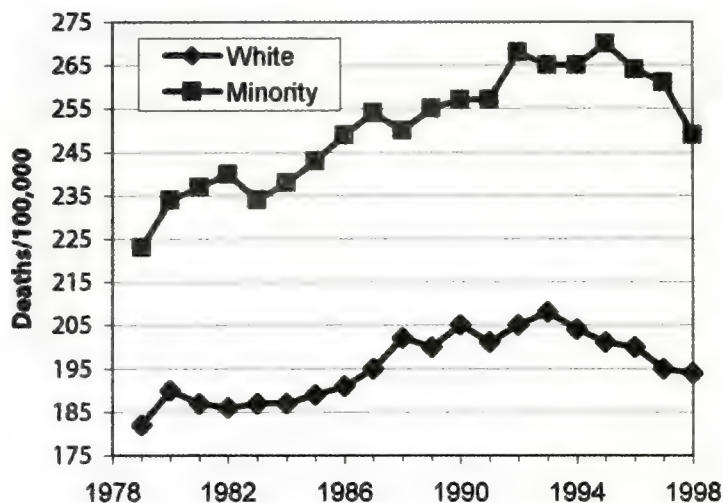


Figure 4. Age-adjusted rates of death due to cancer in North Carolina.

civic organizations. In collaboration with the Office of Public Information, we have published and distributed news releases in English and Spanish to provide the public with up-to-date information about the disease. Stories about rubella have been featured in our quarterly newsletter, *The Provider Update*, which is distributed to county health departments and private health-care providers across the state. We strongly encourage health professionals to assist our rubella education efforts.

Flu and Pneumonia. Legislation sponsored by Senator Bill Purcell, chairman of the Senate Health Care Committee, will require adult care homes and nursing homes to ensure that residents and employees are immunized against flu and pneumococcus. During November we provided pneumococcal conjugate vaccine to all public and private health providers enrolled in the Universal Childhood Vaccine Distribution Program. Children aged 2-59 months are eligible for the vaccine, as are Medicaid-eligible, uninsured, or underinsured persons. Pneumococcal conjugate vaccine is designed primarily to protect children against meningitis and is available for private purchase.

Tuberculosis

The tuberculosis incidence rate in North Carolina fell from 10 cases/100,000 persons in 1990 to 6.37/100,000 in 1999. Over the past year, there were 22 active cases in the Wake County homeless population, and smaller clusters of similar cases in Mecklenburg County. The state is providing free diagnostic and treatment services for all suspected and confirmed cases of tuberculosis in an effort to make the private sector aware of the special problems of the homeless and the importance of observing medication administration. We also

provide local health departments with consultation advice on case management, contact investigations, and prevention services.

Diabetes Prevention and Control

Our state has the nation's eighth highest rate of diagnosed diabetes. In 1998, there were 360,000 diagnosed adult cases of diabetes. If persons under the age of 18 or the estimated number of undiagnosed cases were included, the total number of people with diabetes in North Carolina would be about 500,000. In North Carolina, diabetes is more common among African Americans, Native Americans, women, older adults and persons of lower education and income categories; it is especially prevalent in northeastern, south central, and far western regions—all areas with large numbers of

ethnic minority residents. Diabetes is the seventh leading cause of death, putting North Carolina in the top 10% of US states in diabetes mortality. Diabetes is also a major risk factor for cardiovascular disease, end-stage renal disease, blindness and lower extremity amputations. Care of diabetes and related conditions cost the state approximately \$1.5 billion in 1998. The NC Diabetes Prevention and Control Unit is finalizing a three-year diabetes strategic state plan addressing communication, community outreach, and health care.

The NC Diabetes Prevention and Control Unit is working to reduce the burden of diabetes in North Carolina through policy and environmental change, education, community involvement, clinical interventions, and surveillance activities. In 1994, the State Health Director appointed a Diabetes Advisory Council. The Council works with state and local organizations, including ECU's Brody School of Medicine, the Commission on Indian Affairs, the General Baptist State Convention, the NC Community College System, community health centers, the Kate B. Reynolds Charitable Trust, Medical Review of NC, and local health departments to develop and advocate strategies for the detection, control, and prevention of diabetes.

Project DIRECT, based in southeast Raleigh, is the largest CDC-funded diabetes demonstration project in the country. It is designed to reduce the burden of diabetes in African Americans. It uses a community coalition and Executive Committee to guide its three-pronged interventions: health promotion, outreach, and diabetes care.

Cancer Control

Last February, an external evaluation of the Central Cancer Registry found it to be "a remarkable organization with a staff

of highly skilled and dedicated people." It does a very credible job with a relatively small staff. The National Cancer Institute's Surveillance, Epidemiology, and End Results program (SEER) plans to expand, possibly into a southeastern state. The Registry has been working with the UNC School of Public Health to become part of the SEER program, which would allow the Registry to improve its case ascertainment. This could greatly enhance the usefulness of our data in the delivery of both public health services and cancer care. It would contribute significantly to research programs at the state's medical schools and the School of Public Health.

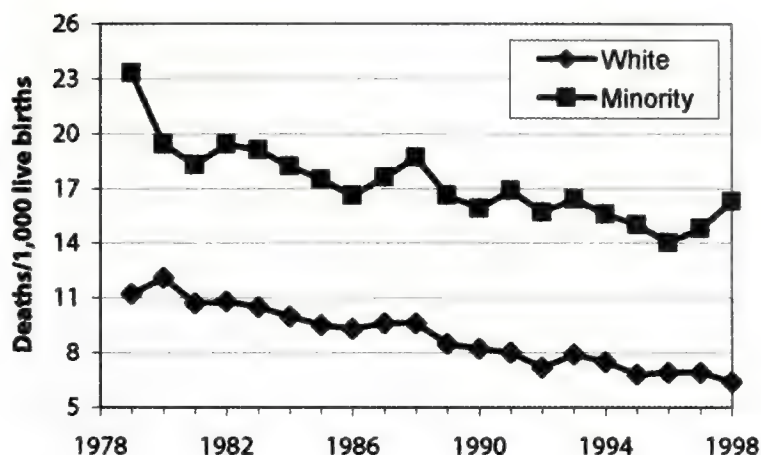


Figure 5. Infant mortality rates in North Carolina.

Bioterrorism

Several new measures will help protect North Carolina citizens from the emerging threat of bioterrorism. The State Laboratory of Public Health is being upgraded to level 3 so that it will be capable of testing biologic agents requiring respiratory security. The lab already assists the FBI and SBI in testing for certain agents such as anthrax. An electronic Health Alert Network will link public health, hospitals, emergency medical services, health statistics, and critical responders in a national, multi-year effort to improve collection and interpretation of surveillance data.

The Division of Public Health and the North Carolina Hospital Association will conduct county and multi-county training exercises involving hospitals, public health, and local emergency response agencies. The Division is a member of the North Carolina Emergency Management Terrorism Preparedness Advisory Committee and leads its own Public Health Bioterrorism Planning Task Force. In November, it held a Bioterrorism Symposium and Exercise for the state, county, and city representatives of departments critical to North Carolina's bioterrorism emergency response.

Hurricane Floyd Flood Follow-Up

DHHS created a "Summer 2000 Hurricane Floyd Recovery Corps," which placed more than 300 students from 23 of North Carolina's four-year, degree-granting colleges and universities at work for up to 12 weeks. Over the summer, 150 students worked in 52 different agencies at tasks like conducting door-to-door community surveys of needs. This bottom-up approach complemented the traditional top-down disaster-relief response.

The Division of Public Health is reassessing the impact of flooding on the homes and the health status of flood victims. The Division has contracted with the UNC School

of Public Health to review hospitalization and Medicaid data to determine whether widespread flooding of buildings influenced the asthma epidemic. The project will include home inspections and consultative services for study subjects.

The Division has allocated \$500,000, granted by the Robert Wood Johnson Foundation and the Burroughs Wellcome Fund, to the UNC School of Public Health and the University of Maryland School of Medicine to study environmental and public health impacts of flooding. This will include surveillance and screening for selected pathogens in waste lagoons, surface water, and groundwater; tracking of specific microbial strains; and tracking of antimicrobial resistance.

Prescription Drug Assistance Program

In 1999, the Prescription Drug Assistance Program got \$500,000 from the General Assembly. This made prescription medications for cardiovascular disease and diabetes available to people 65 years old and older with incomes under 150 % of the federal poverty level. Those eligible receive a benefit card honored by most pharmacies in North Carolina, but patients must pay \$6 for up to a 100-day supply of each prescription. Presently, all prescription medications – plus insulin – for the treatment of diabetes mellitus are covered, but the program does not cover diabetes-related supplies such as needles, syringes, test strips, lancets, etc. With respect to cardiovascular disease, the program covers all medications except potassium supplements, pentoxifyllin, and medications for treating hyperlipidemia. The General Assembly has appropriated \$1 million this year for statewide expansion of the program. Presently, enrollment has been capped at 2,500 persons, and there is a waiting list of about 700 applicants who will be enrolled if additional funds become available.

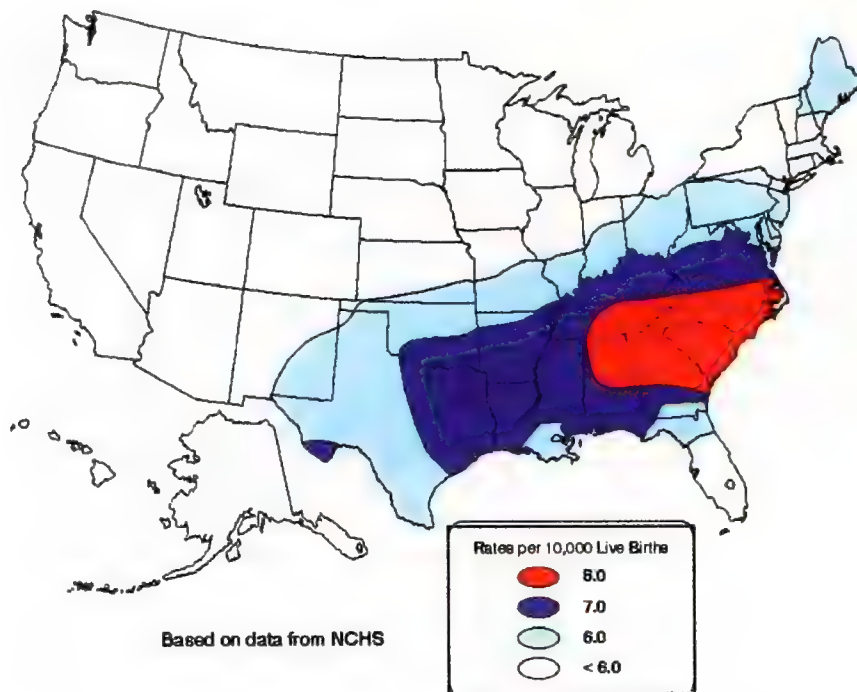


Figure 6. Estimated rates of open spina bifida among whites in 1980.

Smart Smiles: Pilot Project in Pre-School Oral Health

The innovative "Smart Smiles" project trains medical doctors, nurses, and physician's assistants to apply fluoride varnish to the teeth of young children at risk for early childhood tooth decay. The Oral Health Section is helping to train medical providers in fluoride varnish placement, oral assessment, oral hygiene instruction, and nutritional counseling. The Appalachian Regional Commission funded this collaboration of the NC Division of Public Health, Oral Health Section, with Dental Medicaid, Ruth and Billy Graham Children's Health Center, UNC-CH Schools of Public Health and Dentistry, and NC Partnership for Children (Smart Start) in 11 western counties where almost one-third of the children entering kindergarten have significant oral health problems. Projects like 'Smart Smiles' can reduce dental disease among preschool-aged children and improve their access to dental care. The importance of oral health to overall health and wellness has been the topic of two important recent studies: the NC Institute of Medicine's report on "Access to Dental Care," and the Surgeon General's Report on "Oral Health in America."

Harmful Algae Blooms

In October, the National Conference on *Pfiesteria* summarized current research on *Pfiesteria*, the biological history of

the organism, and its potential effects on human health and the environment. While no new science was revealed, the conference laid a useful foundation for future research and Federal funding. According to a multi-state surveillance report, no *Pfiesteria*-related fish kills were documented in NC during 1999 or 2000, and no confirmed Possible Estuary Associated Syndrome (PEAS) cases have been reported to date in North Carolina or the other four participating states (Virginia, Maryland, Florida, and South Carolina).

Folic Acid and Neural Tube Defects

North Carolina has the nation's highest incidence of neural tube birth defects (spina bifida and anencephaly) (Figure 6). Only 78% of North Carolina women 25-29 years old are aware that taking folic acid supplements can lower the incidence of neural tube defects, and less than 26% of these women take folic acid daily. Doctors can educate and encourage women to comply; yet, in 1998, 30% of providers did not know the recommended dose of folic acid or suggest it for their patients of childbearing age. Only 56% knew that a woman is unlikely to get enough folic acid through diet. If North Carolina women took folic acid, 70-100 babies would be saved from pregnancy termination or infant death, and another 70-100 from being wheelchair-bound. The cost savings would be enormous (\$2-4 million annually), but folic acid supplementation will have even a greater impact because it can prevent other birth defects, improve low birth weight,

and reduce cardiovascular disease and cancer in adults.

Using grant funds from the March of Dimes and the CDC, North Carolina has begun a 'Folic Acid Campaign' that seeks to have all women of childbearing age take a multivitamin containing folic acid every day. This campaign is being implemented in five regions of the state, where, using newly awarded state funds and funds appropriated by the General Assembly, it will complement and expand existing activities with media events, provider education, public/private partnerships, conferences, evaluations, and educational exhibits. The State Center for Health Informatics and Statistics will monitor the number and rate of neural-tube defective pregnancies and births, and conduct telephone surveys on multivitamin consumption and awareness.

West Nile Virus

West Nile virus arrived in North Carolina on October 20, 2000, when a dead crow carrying the virus was found in Chatham County. The Division of Environmental Health's Public Health Pest Management Section has taken a proactive stance by monitoring viral activity, promoting education about West Nile virus, and preparing a statewide emergency response plan. The Section monitors West Nile virus activity in mosquito pools, dead birds, and blood samples drawn from sentinel chicken flocks already used to track Eastern Equine Encephalitis virus. The Section maintains a toll-free phone number, a dedicated e-mail address, and an on-line form for reporting dead birds. Information from outside North Carolina is monitored via daily electronic communication with the CDC and other states, through news articles, and through weekly conference calls with the CDC and other states. As part of its emergency response planning, the Section has mapped areas for possible aerial spraying, met with state and commercial aviators who might perform aerial spraying, and ordered 170 ultra low-volume sprayers for ground spraying and 100 computers and software for enhanced communication with local agencies.

Social Marketing for Public Health

Many of the leading causes of death and disability are grounded in unhealthy behaviors, so it is critical that we educate people about health risks, healthy behavior, and community resources for health improvement. This year, North Carolina was one of 21 states to receive a grant from the Robert Wood Johnson Foundation for a project called Turning Point. We will use the funds (totaling nearly \$645,000) to encourage healthy lifestyles and initiate environmental changes. It simply is not acceptable to have some of the nation's worst health statistics in terms of tobacco use, physical inactivity, and obesity – and 98 % of North Carolina

adults have at least one of these three major risk factors. And it begins young – 12% of children aged 2–4 years are obese, as are 18% of those aged 5–11, and 23% of those aged 12–18.

We have signed a contract with the Agency for Public Telecommunications for a series of 12 hour-long call-in shows, called "North Carolina Public Health Today." The first show aired on November 16. Scheduled topics include bioterrorism, public health and genomics, emerging illnesses, racial disparities in public health, the uninsured, asthma, and more.

Child Abuse as a Public Health Problem

Child abuse is an enormous problem which, in many respects, behaves like an infectious disease: when not treated properly it proliferates. Abused children who are not effectively diagnosed and treated are at high risk to become abusers themselves as adults. There is a significant relationship between childhood abuse and risk-taking behaviors in both adults and children. These risky behaviors include drug and alcohol abuse, smoking, obesity, multiple sexual partners, unprotected sex, suicide attempts, and physical inactivity. Abused children are at increased risk to become adults with serious illnesses like ischemic heart disease, cancer, chronic bronchitis or emphysema, hepatitis and jaundice, skeletal fractures, stroke, and diabetes. In North Carolina, reports of abuse of children aged 0–18 years have increased over the last few years: 114,152 cases in 1997–1998; 127,930 in 1998–1999; and 129,550 in 1999–2000. We need a public health/medical model to address child abuse effectively, one that stresses training of community doctors in early detection. Doctors could refer complicated cases to a network of centers for specialized, multidisciplinary evaluation and treatment of child abuse. These centers would also train specialists in child abuse evaluation and treatment. The model would stress an evidence-based approach to child abuse treatment, focusing on assessment of risk factors and preemptive interventions. It would integrate the many sectors – health, social services, law enforcement – that now address child abuse in isolation.

The Doctor as a Member of the Community

I want to close with a brief look at the role and responsibilities of doctors as important members of a community. Doctors are valued and respected for their skills and their commitment to serve their patients. Every day they encounter and respond to the effects of the social and physical environment on the community. They deal with the end result of what are called the new morbidities: smoking, poor diet, obesity, sedentary lifestyle, substance abuse, and other unhealthy choices. While we can treat and ameliorate these problems,



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it is far better—and possible—to prevent them. This prevention should be considered one of every doctor's most important roles in the community.

I submit to you that the Medical Society as a group, and each member individually, can play a much greater prevention role in the community. How? You can bring the issue of access to quality health care to your local Board of Health or County Commissioners, and you can work with your local health department, your hospital, and your colleagues to meet this need. As an influential community member and expert on health, you can speak publicly for school health reforms like improved ratios of school nurses to students, effective health education curricula, training for lifelong physical fitness, and healthy foods at school. Children spend about a thousand hours a year in school; they may spend 45 minutes a year with the health care system. Imagine the impact on child health if we increase our influence in the schools!

Think about it. You can work for an environment that encourages physical activity. You can support bike lanes and trails, parks, walking and jogging paths. You can endorse organized recreational activities for children and adults through churches, YMCAs, and county recreational departments. You can tell your General Assembly representatives that we need to provide health insurance to all children whose families make less than 300 % of the federal poverty level, that we want support for a public information campaign that will make folic acid supplementation the rule rather than the exception for women of reproductive age. In so doing, you will save the state millions of dollars we currently spend to treat children with spina bifida.

With the support of the Medical Society, we can work together toward a time when doctors in every county will assume a leading role in setting the state's legislative agenda on health, when they will be a consistent and effective voice for addressing the health needs of North Carolina's citizens.

Addressing Health Professions Shortage Areas in Eastern North Carolina

John Frino, MD

About 20% of the US population—more than 50 million people—but only 9% of the nation's doctors live in rural communities.¹ Any area that has only one full-time primary care doctor for every 3,500 people is designated as a health professions shortage area (HPSA). Although the US has an overall surplus of medical doctors, there is a great and continuing problem with inequitable access to care, especially in rural areas. If the current maldistribution continues, we will continue to have HPSAs, despite what politicians promise during election years.

Rural eastern North Carolina faces the problem of physician shortage. So far, neither lawmakers, nor health care professionals, nor citizens of the state have found a solution for this problem. In this paper I look at what is currently being done to address HPSAs in North Carolina and other states. Drawing on my experiences as a medical student in eastern North Carolina, I consider the impact of several measures: making increased funds available to HPSAs, increasing the numbers of doctors in rural North Carolina, and using non-physician providers in rural areas, and I look at ways in which legislation could be part of the solution.

Pay Them and They Will Come: More Dollars for HPSAs

Title VII of the Public Health Service Act passed by Congress in 1963 supports the training of generalists who will practice in medically underserved areas. It authorizes programs to improve the supply and distribution of health professionals by awarding funds to schools and training

programs that foster the development of providers who will one day practice in underserved areas. Originally, Title VII focused on increasing the numbers of doctors, and it succeeded. The number of doctors per unit population rose by 34% between 1950 and 1980, but by the mid-1970s it became clear that this supply-side strategy was not inducing doctors to practice in shortage areas. So Congress passed the Health Professions Education Assistance Act of 1976, which redirected Title VII programs to improve geographic distribution by inducing generalists to practice in medically underserved areas.

Still, no one has solved the distribution problems that led to the Health Professions Education Assistance Act, so we must look at ways to change specific aspects of programs if we are to reduce the numbers of medically underserved areas. Politzer et al looked at how theoretical changes—particularly increased funding for Title VII—might affect future physician distribution and the time to eliminate medically underserved areas. In 1996 and again in 1997, \$23.5 million Title VII dollars per year were devoted to graduate training for primary care (family medicine, internal medicine, and pediatrics). They estimated that, since 32% of family practice and 38% of medicine/peds trainees in Title VII-funded programs enter practice in medically underserved areas, it would take 15 years of funding at the 1997 level to attain the ratio of 1 doctor per 3,200 population needed to eliminate all HPSAs. If the level of funding of Title VII programs were doubled—and if this led 50% of graduates to practice in medically underserved areas—the time to elimination of HPSAs would be decreased to 6 years. Although hypothetical, the model shows the impact of dollars on the HPSA problem.¹

Of course, Congress has fiscal avenues other than Title VII funding to help eliminate HPSAs. One example is the Critical Access Hospital program, passed as part of the Balanced Budget Act of 1997. This program funds hospitals in rural areas to deliver outpatient, emergency, and limited

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inpatient services, but only a paltry \$25 million was authorized annually for five years to accomplish this goal.² The results of the program will be assessed at the end of the 5-year commitment.

Part of the difficulty with government funding is how the services provided by doctors and other healthcare workers are viewed. Some argue that healthcare is a right and services an entitlement; others argue that such services are privileges. The truth probably lies somewhere between these two poles, but I believe that, if lawmakers looked at medical practices as business entities, susceptible to all market pressures, they would recognize that financial assistance is essential to eliminating HPSAs. There are many challenges to developing and maintaining medical practices in shortage areas. Medically underserved communities tend to be disproportionately poor and the people who live there, uninsured. This means that medical practices in those areas are likely to experience serious financial problems, analogous to those faced by any small business attempting to start up in a poor and minority community. Because primary medical care practices must function as small businesses, doctors tend to gravitate to communities with the financial resources and service infrastructure that will support a medical practice. Without assistance from state or local governments, doctors are unlikely to seek out or remain in practice in locations with few patients who can pay for primary health care. Of course, any increase in the number of individuals with health-care insurance would also attract physicians to rural, medically underserved areas.

Getting More Doctors into Practice

There are means other than increased funding to eliminate HPSAs. Increasing the number of doctors is a reasonable option. There have been proposals (looked at in limited trials or only in theory) for the use of retired physicians, for the recruitment of international medical graduates (IMGs), or for outreach programs that import physicians from non-rural areas. In addition, some medical schools have increased the number of their graduates who enter practice in rural areas.

The Rural Cancer Outreach Program. Desch et al reviewed the Rural Cancer Outreach Program (RCOP) at the Medical College of Virginia to determine whether such a program might help HPSA patients. The RCOP was developed to bring state-of-the-art medical care to medically underserved rural areas. The RCOP benefits rural cancer patients, but survival of the program depends ultimately on economic viability. The authors found that the RCOP enhanced rural patients' access to cancer care with cost savings for society

(the net annual cost per patient fell from \$10,233 to \$3,862). The authors attributed the savings to use of outpatient services, more efficient use of resources, and a shift to a less expensive locus of care. In addition to cost savings, the rural hospitals involved experienced rapid growth of their programs by more than 200 new patients yearly.³

Overall, Desch et al claim that the RCOP had a positive financial impact on rural hospitals and academic medical centers, improved care-near-home for rural patients, and a lower overall cost of cancer treatment. This study did not examine generalist care, but it does offer a hope for providing care to rural underserved populations. The partnering of academic medical centers with rural hospitals may provide both better care for rural areas and economic advantage. Solutions in which both parties benefit should be the standard for every program.

"Many educators feel that part of the difficulty in attracting and retaining physicians in HPSAs is that the doctors are ill-prepared for rural work and small-town living."

Academic Initiatives. Outreach programs may help HPSAs that are geographically close to academic medical centers, but they are unlikely to help very isolated areas. We must find ways to induce doctors to locate their practices in remote areas of need. Medical schools have been at the forefront of looking at this very problem. Many educators feel that part of the difficulty in attracting and retaining physicians in HPSAs is that the doctors are ill-prepared for rural work and small-town living. Studies support some, but not all, of the popularly held beliefs about this. For example, Pathman et al found that the likelihood of staying in rural practice does correlate with the doctor's

sense of preparation for small-town living, but not with preparation for practice in a rural environment.⁴ Doctors who understood small-town living were twice as likely to stay in practice there as doctors who were unprepared. Training rotations that provide 3 months or more of experience in rural areas during medical school or residency often lead doctors to settle eventually in rural areas.⁴ Rosenbaum et al found several features of medical schools—public ownership, greater numbers of family practice graduates, and fewer NIH dollars—that were positively associated with how many of the school's graduates practiced in rural areas.⁵

East Carolina University. In recruiting students who are likely to work in HPSAs, medical school admission committees should recognize that being prepared for living in a rural community is more important than preparation for the practice of rural medicine. This is precisely what East Carolina University (ECU) School of Medicine does in order to produce doctors who want to practice in eastern North Carolina. A good percentage of the ECU medical school class has lived in or has ties to eastern North Carolina. ECU

knows that these students, already familiar with small-town living, are likely to work in rural North Carolina.

Jefferson Medical College. The Physician Shortage Area Program (PSAP) of Jefferson Medical College has, since 1974, recruited and selectively admitted medical students who grew up in rural areas and who intend to practice family medicine in rural and underserved areas. The 15 PSAP medical students in each class have family doctor faculty advisors, take a third-year family medicine clerkship in a rural location, and spend a senior outpatient subinternship in family medicine. After graduation, PSAP graduates are expected to enter a family practice residency and to practice family medicine in a rural and underserved area, although this is not enforced.

In 1997, Rabinowitz et al found that Pennsylvania's seven medical schools had sent 150 graduates from the classes of 1978-1991 into family practice in rural Pennsylvania; 32 of the 150 (21%) were PSAP graduates of Jefferson Medical College, even though that program had produced only 1% (206/14,710) of all Pennsylvania graduates during those years. Looking just at Jefferson Medical graduates, 68 of 200 PSAP graduates (34%) were practicing in rural areas, compared to 303 of 2701 (11%) non-PSAP graduates.⁶ Getting doctors to practice in rural areas is one thing, keeping them in practice there is another. The PSAP program seems to have succeeded; in 1997, 87% of the PSAP graduates practicing 5-10 years earlier were still in practice.⁶

Jefferson Medical College appears to have found a way to find and nurture students who are likely to practice primary care in a rural underserved area. Certainly, the PSAP program has made a substantial contribution to the supply and retention of practitioners for rural and underserved areas. Other medical schools that want to increase the supply of rural physicians could develop targeted programs similar to the PSAP model. However, rural communities are the primary beneficiaries, and medical schools have few incentives to develop these programs. Policy makers must work with medical schools to develop financial incentives or regulatory pressures.

Enhancing Clinical Practice. In addition to trying to increase the number of students entering rural practice, academic medical centers have developed other programs to meet the needs of rural and underserved areas. For example, the University of New Mexico Health Sciences Center and ECU School of Medicine developed *locum tenens* programs to address health care needs within their states. In collaboration with state government representatives and agencies, the programs provide temporary practice coverage so doctors in

rural and medically underserved regions can get some time off. Doctors in struggling practices get relief, the *locum tenens* providers get training in rural medicine, and the relationship of rural doctors and academic programs is improved.⁷ Funding for such programs comes, in part, from appropriations by state legislatures, but most comes from payment for locum tenens services by individual practices.

International Medical Graduates. One proposal for helping HPSAs is to increase the number of International Medical Graduates (IMGs) practicing in these areas. IMGs are medical graduates of schools located outside the US and Canada. Between 1988 and 1995, the number of IMGs enrolled in US residency programs more than doubled (to 26,763), while the number of US medical graduates (USMGs)

remained relatively stable. However, it is not clear whether IMGs reduce the shortage of doctors in rural areas or just contribute to the national oversupply of doctors. Baer et al found that IMGs constitute a greater percentage (18.7%) of the primary care workforce in rural underserved than rural non-underserved areas (14.3%). But there is one great incentive inducing IMGs to enter practice in rural HPSAs: their visa status. IMGs enter the US and train or work under exchange visitor visas (J-1 visas). After a specific term, J-1 visa holders must return to their home country for 2 years before they can apply for permanent status in the US. A waiver of the requirement to

return home can be granted in return for practicing in an underserved area. The number of requests for J-1 visa waivers in return for practice in underserved areas increased from 70 in 1990 to 1,374 in 1995. As of 1995, more IMGs requested waivers (1,374) than were on active service with the National Health Service Corps (1,267).³ The incentive of the return-home waiver is one reason why IMGs are more likely than US medical graduates to practice in rural HPSAs, and thus IMGs may not provide a long-term solution.

"Physician assistants, nurse practitioners, nurses, pharmacists, social workers, and medical students already working in rural communities could mitigate the lack of doctors in HPSAs."

Better Use of the Healthcare Workforce

The current supply of primary care doctors falls short of the need in underserved rural locations. This means non-physician health professionals may be able to narrow the gap in coverage. Physician assistants, nurse practitioners, nurses, pharmacists, social workers, and medical students already working in rural communities could mitigate the lack of doctors in HPSAs. Designation as a shortage area is based only on the number of doctors, so these communities may have a number of other health care professionals already in place.

Knapp et al noted that the presence of pharmacists allows a number of HPSA residents to have at least some access to health care resources and expertise. The favorable distribution of pharmacists appears to be due both to large numbers of professionals overall and to their higher rate of distribution into HPSAs than primary care doctors.⁸ Pharmacists are good candidates for measuring and monitoring blood pressure and weight, for checking home glucose monitor results, and for educating patients about the appropriate use of medications and devices. Until HPSAs are eliminated, such an interdisciplinary approach may provide an interim solution to primary care shortage.

As a student, I myself took part in the Health Care for the Underserved experience. This included a one-week rotation in eastern North Carolina where I participated in the health care of the community without the direct supervision of a physician. Student duties included checking blood pressure and blood glucose, as well as community health education at the local high school. We were not qualified to provide acute medical care, but we did fill a need and added to the overall health care of a HPSA. Innovative solutions that do not increase current costs may be a temporary solution until government funding increases.

The Effect of Legislation

A number of communities, medical schools, and state governments have tried to equalize physician distribution across geographic areas, but all attempts thus far have failed. New national legislation may be needed to solve this problem. An example is the Medical Assistance Facilities (MAF), limited-service hospital model. MAFs were granted relaxed Medicare staffing regulations, such as ratio of doctors to nurses on staff, and they get cost-based reimbursement from Medicare and Medicaid.⁹ Flexible Medicare rules allow for more appropriate staffing (including off-site medical supervision of care provided by nonphysician providers, and fewer registered nurses on staff). HPSAs that receive these favorable benefits have added chances to improve healthcare in their communities.

Current Medicare policies on the funding of graduate medical education (GME) seem to contribute to rural physician shortages. The Medicare program, a major supporter of GME, does not equitably distribute federal investments across communities and states. For example, in Washington, DC, the per capita spending for GME is nearly \$162; in rural Mississippi it is \$3! This financial bias toward urban training perpetuates the HPSA dilemma, since doctors tend to practice where they train. The Balanced Budget Act of 1997 made provisions to pay part of GME expenses directly to the rural health centers that incur costs of a training program. However, this covers only the direct medical expense portion of Medicare GME dollars, which is only half as much as the

indirect expenses that are paid to teaching hospitals. The Balanced Budget Act helps, but more is needed.

Conclusions

The student elective called "Health Care for the Underserved" allowed a group of first and second year medical students to see first hand the delivery of care to a town in eastern North Carolina. Those taking that elective tried to add to the public health of the community through blood pressure and glucose screening and community education. The direct impact was minor, but the experience enticed us to look further at the nature of rural practice.

A number of other approaches to eliminating HPSAs have been proposed or put in place. These include increasing the current level of funding of programs to encourage rural practice, new academic programs to enroll and encourage students interested in rural life and practice, enlarging the presence of doctors, using non-physician providers, and new legislative maneuvers. All of these and more, in concert, may help alleviate the problem of HPSAs, a persisting and troublesome shortcoming in the nation's health care picture.

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Learning the Thunder

Blaine Paxton Hall, PA-C

In the hospital dialysis unit, where I spend a lot of time, patients' blood pressures often fall, sometimes quite low; on any given visit to the unit one sees the foot of most beds raised in Trendelenburg position. And when patients (those who are able) stand up on the scale for a post-treatment weighing, they often collapse in a faint. The other day, one of the young doctors-in-training who was working in the unit launched into oration on how to distinguish a seizure from syncope.

I didn't tell the young doctor, but I've seen a few seizures in my lifetime. In fact, I'm certain that I'd seen more seizures by the age of 5 than he is likely ever to see in his entire career. My father had epilepsy and suffered what they called *grand mal* seizures. His young, primigravid mother had died of eclampsia and uremic poisoning while prematurely giving birth to him. He was born weighing 4 pounds; in 1929 this was quite a precarious state for an infant, but he survived. His seizures, which began when he was about 2 years old, were thought to have been caused by birth anoxia and his mother's toxemia.

My father could never get a driver's license, of course. Today a young man could hardly live a life if he couldn't drive. Fortunately in Chicago public transportation was quite accessible, even in the early 1950s. My mother was institutionalized when I was 2 years old, and so I accompanied my father just about everywhere he went. I even went with him a couple of times to the factory where, in those earliest days, he was trying to hold down a job. He was proud of his ability to navigate the city using public transportation. This was at about the time that the track trolleys were being replaced with trolley buses, which we rode in addition to the subway trains and the "El" (elevated) trains. We went everywhere together: to Wrigley Field to see the Cubs play, to Soldier's Field to see the fireworks, to Moody Memorial Church, to Lake Michigan for fishing, to the Museum of Science and Industry to see the outer space capsule and the "coal mine." We went to the bank, and we bought the groceries together.

In subzero temperatures, we walked to the neighborhood filling station to buy oil for the stove that heated our tiny apartment. We both carried the 10-gallon drum home; the metal handle froze my hand, anesthetizing it from the pain of the red welts made across my palm. Later he bought a Flexible Flyer snow sled, and we pulled the oil drum home on it. It was easy enough for him to pull the sled; once in a while he let me ride on it behind the oil drum, instead of helping him pull.

I realized early on that he had a purpose in letting me accompany him everywhere he went. I was along to take care of him when he had one of his frequent seizures. I now know that he felt a bit more secure when I was with him, but he of course resented being dependent on me, or on anyone. Unfortunately, his volatile temper, his unpredictable rages (and the beatings that followed) made me want to avoid him as much as I could. He made sure that I memorized the pertinent phone numbers and addresses; he knew that I could get us home safely, if need be. He taught me how to get around in Chicago with him, how to summon the police or ambulance if needed, how to fight in case I was "jumped," and how to hide his wallet in my sock.

Every month he got a small box in the mail. It made a mysterious and muffled rattle when I shook it. Inside were several small, variously shaped, and almost artistically constructed boxes of pills. The boxes were not "tamper proof," not sealed in those days, so I knew that each box contained a different pill or capsule and had a thin cotton sheet under the lid. In one box were dainty, lavender tablets, which were scored in the middle and had a bitter smell. Another box had small, smooth, white capsules, each with a red stripe around it. He was supposed to take a handful of multi-colored tablets and capsules three times a day. He taught me how to count them out for him, but often he didn't take his medicine.

One day, coming home late on the CTA bus, he had a particularly bad seizure. We were tired and had been sitting quietly, bumping along on the bus. The other passengers were similarly quiet and resigned to the bus ride, idly watching the night lights flash by through the windows. Both of us could tell when a seizure was coming on. He

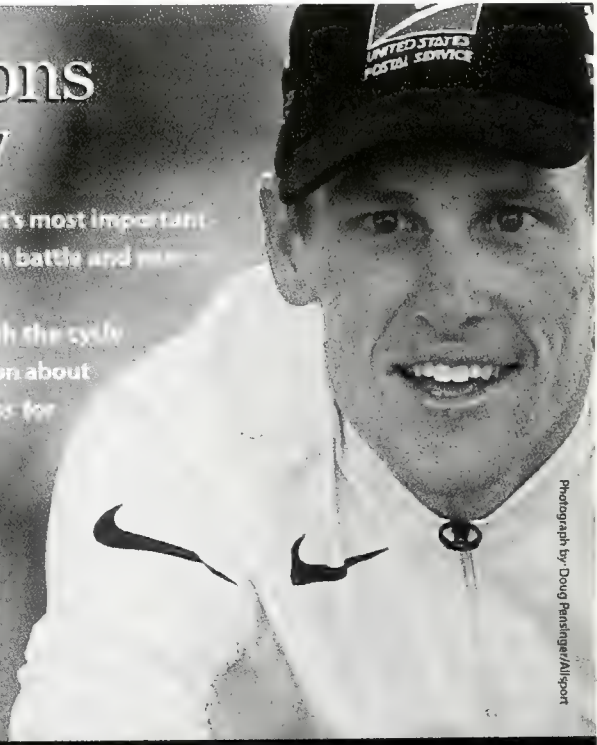
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looked at me with his typical prodromal expression on his face, eyes wide with terror. There was a look of embarrassment, as though he was trying to be nonchalant about the seizure that we both knew was whipping up its fury. At the same time, his periorbital muscles contracted, twisting his face into grotesque contortions. It seemed as though he was trying with all his might to keep his mouth from flying open, and (I imagined) screaming out the terror that was apparent all over his face. His efforts caused obscene-sounding lip-smacking, which, as the electrical storm thundered across his brain, eventually gave way to grunting, groaning, and snorting. I was terrified at seeing my father in such agony. He seemed so utterly pitiful I could hardly stand it. Eventually his whole body was wildly convulsing until he ended up on the floor of the lurching bus. All the passengers stared at us. I did as I knew to do: watch him carefully; ease him down to the floor, onto his side if possible; loosen his collar; not stick my fingers or anything into his mouth; and—probably most difficult of all—just watch and wait. I could see that he'd been incontinent of bowel and bladder, and soiled his clothing. I knew that after the seizure had thrashed him he'd be incapacitated with confusion, and so I made sure that we got off

the bus at the right stop. He leaned on me and stumbled like a drunk as we walked the short distance to our front door. Inside, he collapsed on the couch and slept deeply without moving until the next morning.

How frightened and anxious I was to see my father so weak and whipped. I knew his epilepsy was humiliating for him; I sensed he felt guilty that his own birth caused the death of the mother he never had. I did not know then, but do now, why epilepsy once carried the stigma of demonic possession. The effect it had on his life, and those around him, was devastating. Eventually it led to my placement in a Children's Home where I grew up. I learned at too young an age how weak and impotent we are under "the slings and arrows of outrageous fortune."

I didn't tell the young doctor in the dialysis unit how much more there is to the understanding of epilepsy than, for example, a pat distinction between seizures and syncope. How much more there is to medicine than glib recitations of the text-book. I am still learning it, still learning to read the thunder, but there are times I've wished I didn't know anything about it at all.



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Climbing Up The Pyramid

My Experience As a Surgical Resident at Duke, 1936-1942

Will C. Sealy, MD

A pyramid is often used to depict the method of graduate surgical education used by Dr. William Halsted at the Johns Hopkins Hospital. The base represents the interns who enter the program; over succeeding years all except one are eliminated, leaving the Resident at the pinnacle. In 1936, it was my good fortune to begin as an intern in a slightly modified Halsted program brought to the new Duke Hospital in 1930 by Dr. Deryl Hart, the first Chairman of Surgery at Duke, who had recently completed his residency at the Johns Hopkins Hospital. From 1936 to 1942 I was a member of the surgical house staff at Duke, a remarkable institution that has contributed so much to advances in medical education, research, and the delivery of health care.

In 1936 the Great Depression was easing, but one could see the signs of greater world catastrophes yet to come. Surgery was enjoying the Golden Era that had begun 90 years earlier with the discovery of anesthesia, was nurtured by advances in surgical pathology, and finally was greatly expanded by use of sterile procedures. Medical treatment, on the other hand, was for the most part ineffective; the pharmacopeia still contained Paracelsus' mercury, Withering's digitalis leaf, Ehrlich's arsenic, Peruvian bark, a few pain killers, and some laxatives. The first flicker of light on the horizon occurred in 1935 when Domagk reported that a sulfa compound, sulfachrysoidine (Prontosil), could control many previously fatal infections.¹ This was the start of the phenomenal development of medical sciences that I have personally witnessed—a greater change in the last half-century than in the thirty centuries preceding.

My personal experience as an intern in 1937 emphasizes the miracle of the sulfa drugs. I admitted a middle-aged woman from Eastern North Carolina, acutely ill with recurrent lymphangitis in a post-phlebotic leg. Thirty-six hours

after we started intravenous administration of the purplish-red Prontosil, her temperature became normal and the inflammation subsided. She was the first patient to receive a sulfa drug at Duke.

The New Intern Arrives

My introduction to Duke Hospital came on June 29, 1936, after an all-day train ride from Atlanta. On leaving the train, I was struck by the pervasive but not unpleasant aroma of "tobacco, toasted tobacco," just as the Lucky Strike ads proclaimed. This pleasant odor was a marker of much of the social and economic activity in North Carolina at that time. I had never visited Duke Hospital before. When I arrived, George Joyner, the Senior Assistant Resident in Surgery, showed me my room near the hospital entrance. The next morning, I met Dr. Hart for the first time. Then, without ceremony, I was put to work by William Haltom, Resident in Urology, on the male ward of private urology service (the most difficult of the intern's rotations). My ascent up the pyramid began in a strange place among strangers.

Before going further I need to define the terms used in 1936. An intern was a first-year house officer who hoped to serve for the next four years as an assistant resident. If successful, in year six he would be the Resident.

Indigent or ward patients, mostly supported by the local government or by a subsidy from the Duke Endowment, made up the large teaching service—about 75 beds for general surgery and nearly that many for the surgical specialties. At that time, Duke Hospital was unique in being the ultimate referral site for both poor patients and those with complicated medical problems from North Carolina, south-

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Figure 1. Surgical staff at Duke University, 1939.

ern Virginia, and much of South Carolina. The hospital was the focus of an informal system of medical care nourished by the Duke Endowment under the guidance of Dr. Watson S. Rankin (advised by Dr. Wilburt Davison, Dean of the Duke Medical School). The Endowment supported medical care in small community hospitals as long as the hospital kept records of patient's hospital stay and sent surgical specimens to the pathologist.

As I remember, in 1936 ward patients at Duke Hospital were charged \$21 for the first week and \$14 for each subsequent week. The extra charge for the first week, which private patients also paid, covered all services including laboratory tests, x-rays, operating room fees, and medicines. Dr. Davison apparently felt that if these services were billed separately, some patients might be denied them on account of cost.

The extraordinary way that Duke Hospital filled its role was a tribute to Dr. Davison, his clinical chiefs (Dr. Deryl Hart in Surgery, Dr. Frederick Hanes in Medicine, and Dr. Nicholas Carter in Obstetrics and Gynecology), and the Hospital Superintendent, Mr. Vernon Altwater. Their goal was to establish a superb clinical center whose faculty conducted a private practice within the Medical Center. This was called a geographic full-time system, in contrast to the whole or full-time system in place in many teaching hospitals.

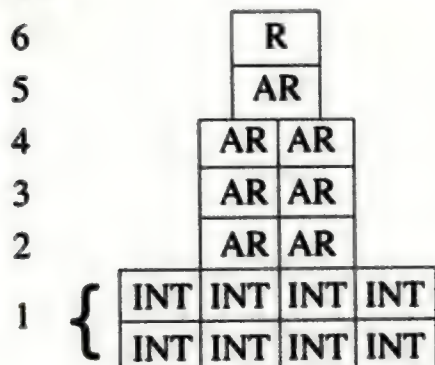
Duke's large outpatient clinic was essentially free. The emergency room was open all the time but only moderately busy, caring mostly for medical problems rather than trauma.

Motor vehicles were fewer and less dangerous. The most interesting outpatient clinic was medical rather than surgical. Medical "S" Clinic convened on Thursday nights to give patients with syphilis Neosalvarsan and mercury. In order to care for the large number of patients, the entire Department of Medicine—senior staff, house staff, technicians and all office help—were needed. It was a social occasion for patients, many of whom lived in the area.

Life on the Surgical Wards

The wards at Duke Hospital, named for famous doctors like Halsted and William Osler, were compact and efficient, consisting of one large room divided into four cubicles of four beds each; there were several other rooms with one, two, or four beds. The Head Nurse, dressed in a starched white uniform with the white cap that identified her nursing school, presided over the unit. Each ward was self-sufficient, so ward personnel did all the cleaning, transporting of patients, and food distribution. The Head Nurse was assisted by other nurses, student nurses, maids, and a male orderly. She stood when the Staff Surgeon or the Resident came to the ward; she knew all the patients and all their problems. Head Nurses were great teachers of interns, and I particularly remember Miss Mildred Sherwood, who ran Howland, the children's ward. Surgical house staff learned about sick children from this talented and kind lady. She was the only person I ever knew who could consistently persuade a small

Yr



In 1936, the house staff lived in the hospital. As was the custom in most teaching hospitals, the interns received no pay. They could not be married. If they survived to become assistant residents, they got \$500 per year; the Resident got \$1,000 per year. Room and four meals per day were provided for the house staff (the food was excellent). At the evening meal during my first year, we sat at linen-covered tables and were served by waitresses. Our rooms were just a few steps from the wards, in what later became the psychiatric ward. The assigned room became the house officer's home, his castle. He could entertain there whomever he pleased without regard to gender, a ruling that came about when one of the two Duke campus policemen tried to break up a mixed-

In 1936, the hospital was nearly always full. When the 1936 intern class entered, the surgical residency program planned to have two assistant residents for years 2-4 and one for years 5-6 (Figure 2). The hospital and medical school functioned as one unit in teaching and patient care. The basic science departments did the clinical laboratory work.

The method of teaching students and house staff was brought from Hopkins. Upon leaving Hopkins for Oxford, Sir William Osler declared, "By far the greatest work of the Johns Hopkins has been [to demonstrate] to the profession...how medical studies should be instructed.... But the amphitheater clinic, the ward and dispensary classes are bastard substitutes for a system which makes the medical student himself help in the work of the hospital...."² At Duke, surgery offered no formal classroom teaching. Students and house staff relied on

the patients to guide and stimulate learning. For house staff the only formal exercise was the Saturday morning Grand Rounds held by Dr. Hart. Surgical staff conferences took place off and on for part of the year. The various departments gave a conference each noon in the amphitheater for medical students and staff. Students on surgery had ward rounds three times a week; there were no lectures or recommended textbook, and no written examinations.

Dr. Deryl Hart, in keeping with his long period of training at Hopkins, did a broad spectrum of surgery, including neurosurgery, plastic surgery, thoracic surgery, and general surgery. He was the best surgeon I ever knew, and later became the fourth President of Duke University. He was a reserved Southern gentleman, dedicated to resident education. As an example of his interest, when I took him my first paper for help he spent hours going over it word by word.

Among Dr. Hart's many contributions was a thorough laboratory and clinical study of ultraviolet radiation to prevent airborne infections in the operating room. Before the advent of antibiotics, infection was common, even in "clean" surgical wounds. I remember a constant infection rate of about 5%, with periods of epidemic increase. After one of these infectious catastrophes in the early 1930s, Dr. Hart began an extensive study of the cause of operating room infections. He concluded that most infections of clean wounds were caused by airborne organisms. Using a team that included a physicist, a bacteriologist, and many of the surgical house staff, Dr. Hart showed that ultraviolet radiation could safely reduce the wound infection rate to about 1%. It seemed well worth the minor inconvenience of wearing skin and eye protection in the operating room.

Dr. Hart was a superb administrator, who selected competent people for positions of responsibility and then didn't interfere with them. For example, once he selected new faculty to lead neurosurgery, plastic surgery, and thoracic surgery, he turned all specialty practice over to them. He had had a large private practice in these specialties, but no longer accepted patients needing specialty surgery.

Two other senior faculty members, both Hopkins graduates, came to Duke as residents in surgery when the program opened. The first three residents were Hopkins graduates. The first, Clarence Gardner, was Duke's best clinical teacher and an excellent surgeon. He helped organize the 65th General Hospital and served as its Chief of Surgery throughout World War II, spending nearly two years in Europe. When Dr. Hart became President of Duke University, Dr. Gardner succeeded him as Chairman.

Randolph Jones, Duke's second resident, had just begun to organize a plastic surgery division in 1942 when he was

murdered by a patient, later found to be insane. Dr. Hart and I were summoned from the operating room to the private clinic where we found Dr. Jones dead from several gunshot wounds. Durwood Lovell, the senior assistant resident, had subdued the assailant, who was carrying two revolvers.

The heads of the specialties through which the surgical residents rotated were all from Hopkins. Dr. Edwin Alyea established a residency in Urology in 1934. Interns in 1936 spent three months on his service, which had many of the sickest patients in the hospital. Dr. Alyea was a fine clinician and surgeon, and a great teacher. He offered me a position on his resident staff and an opportunity to go to another institution for two years of fellowship before returning to Duke. Dr. Alfred Shands was Duke's first orthopedist. Dr. Beverly Raney, later Chairman at the University of North Carolina, was his first resident. Dr. Shands left in 1937 to head the Du Pont Children's Hospital in Delaware.

"Much of the working day was filled with what is now called "scut-work." ... [H]aving to carry out those chores served a useful purpose by bringing the intern into contact with the patient for much of the day."

The Intern's Job

In 1936, the interns spent twelve weeks on urology and six on orthopedics and on bacteriology; the remainder of the year was devoted to general surgery. The intern was responsible for his patients 24 hours per day, seven days per week, and had to "sign out" to another intern to leave the hospital. We literally lived with our patients, for living quarters were sometimes next door to the ward. Much of the working day was filled with what is now called "scut-work." Nurses could not in-

ject medications, draw blood, or give parenteral fluids. In spite of many plausible arguments to the contrary, having to carry out those chores served a useful purpose by bringing the intern into contact with the patient for much of the day. Details of the patient's history missed on admission were detected, and close observation of physical signs added to the intern's knowledge of the patient's problems. Medical student clerks sometimes helped with the intern's work on the staff but not on private patients. The "work-up" of every patient consisted of a history and physical examination, and measurement of hemoglobin, white blood cell count, and urinalysis. A Wasserman serum test for syphilis was required. Differential white counts, bacterial stains on urine and sputum, examination of stool for parasites, and blood smears for malaria were the intern's responsibility.

The morning ward ritual started with the changing of surgical dressings. A cart with sterilized instruments and dressings was made up every day by the nurse. On orthopedics, the interns assembled all sorts of traction devices, some very complicated, and spent long hours in the clinic removing and replacing casts. The two rotations on urology were the

busiest. Urinary tract infections were hard to control. Patients with urethral obstruction due to enlarged prostate were often uremic, with large, tense bladders that were slowly decompressed. Bladder catheters were hard to keep in place and had to be reinserted often, as there were no balloon-tipped catheters available for this purpose.

The bacteriology rotation during the first year was one of the most interesting. Dr. D.T. Smith was Chairman of the Department of Bacteriology and a world-famous authority on infectious diseases, particularly fungal infections. Miss Mary Poston, bright, aggressive, and a great teacher, had day-to-day control of the clinical laboratory. The interns did all wound cultures, all blood cultures and all autopsy cultures on surgical patients. They also were responsible for cross-matching, collecting, and administering blood. Blood donors were eligible if they had a negative Wasserman test, no history of malaria, and shared the blood type of the recipient. The blood was cross-matched by the intern, checked by Miss Poston, drawn from the donor, and given. Transfusions were relatively uncommon, but the donors (usually house officers) welcomed the \$25 fee.

We transfused blood to supply immune substances to patients with sepsis (often staphylococcal). I remember giving many 250 cc transfusions to one of Duke's football players who had been struck on the chest where he had a boil. This led to septicemia and osteomyelitis of the sternum. After months of treatment, he survived. Later, interesting legal questions arose about whether he was a university employee and thus entitled to workmen's compensation.

The surgical problems we saw were very different from those seen today. Terrible and bizarre forms of infection were common, including carbuncles, Ludwig's angina, and cavernous sinus thrombosis resulting from extension of infection of the skin of the face. Other common infections were pleural empyema; brain abscesses, often following a lung abscess; subphrenic abscesses; acute osteomyelitis; and severe lymphangitis, usually secondary to a fungus infection of the foot or a bout of phlebitis. The infection I remember most vividly is acute peritonitis. There were always two or three cases on the service. The most common precursor was a ruptured appendix, often precipitated by a laxative given at the onset of the abdominal pain. The mortality rate was high, but many patients were young and could tolerate the infection and the withholding of oral feedings for three to four weeks. There was little we could do other than intravenous glucose or saline solution, subcutaneous saline solutions, blood transfusions, Fowler's position, and nasogastric suction, a relatively recent innovation in surgery. We were always on the lookout for sources of post-operative fever like

acute parotitis, subphrenic and pelvic abscesses, and, rarely, infected emboli in the portal system and liver. New sulfa drugs appeared between 1936 and 1942, but they were not very effective for some severe infections.

Carcinoma of the stomach was as hopeless then as it is now, and much more common. It often led to an unrewarding abdominal exploration. The same could be said for tuberculous peritonitis, although some doctors thought laparotomy was actually beneficial. Colon cancer was difficult to treat and 15-25% of those operated on died. In 1936, gastric resection for peptic ulcers was just coming into vogue. Surgical removal of large nodular or severely toxic diffuse goiters was an interesting challenge. Medical therapy of hyperthyroidism was not available until 1938-39. Severely hyperthyroid patients were given anesthesia in their rooms, then carried to the operating room. This was called a "thyroid steal." My first clinical paper, which I wrote as an assistant resident, dealt with the staged surgical treatment of severely toxic goiters.

In the operating room, interns served as second assistants. The reward for hours of caring for sick patients on the ward, and the hours of retractor-holding, was to be allowed to do either an appendectomy or inguinal hernia repair at the end of the intern year.

Shortly after I began as an intern, I became aware of the highly competitive character of the Duke Residency: after one year, 6 of the 8 interns would have to find other jobs. When the day finally came, I was one of the two asked to stay on for three years, but only to enter another highly competitive contest for the Resident position.

The two interns selected to remain faced a new assignment in their second year. Previously this year had been spent entirely in Pathology, but in 1937 Dr. Hart established a surgical research laboratory, to which each assistant resident was assigned for six months, leaving only six months for pathology. The clinical departments were very actively engaged in research, for a school not yet six years old. In addition to Dr. Hart's elegant study of operating room infections, other departments had received national recognition for their work. I remember Dr. Ed Hamblin of Gynecology who was nationally recognized for his endocrine studies; Dr. D.T. Smith and colleagues who attracted so many patients with fungus diseases; Dr. Julian Ruffin and others who did extensive studies on pellagra.

Beginning an Academic Career

Dr. Hart selected Dr. Joseph Beard to organize a research division in the department. I was assigned to Dr. Beard's

"Terrible and bizarre forms of infection were common, including carbuncles, Ludwig's angina, and cavernous sinus thrombosis resulting from extension of infection of the skin of the face."

laboratory during his first six months at Duke. He was trying to make a vaccine for equine encephalomyelitis, a common and fatal disease, but also studied the rabbit papilloma virus and the vaccinia virus. The house staff openly complained that my assignment was a long way from surgery, but working with Dr. Beard was never dull. When he arrived at Duke, his laboratory was adequate but the animal quarters were horrible. The dog compound was filthy beyond belief, and there was no satisfactory facility for small animals. The laboratory staff, in addition to conducting experiments, tore down walls, made mouse cages, and installed an animal kitchen in which Dr. Beard concocted a balanced dog ration from horse meat, black-eyed peas, vitamins, and smelly cod liver oil. This was cooked together in a large pot, making a dog stew.

Soon after Dr. Beard arrived at Duke, he and George Newton, a machinist in the Physics Shop, built a quantitative and analytical ultracentrifuge. Right now, I can see this machine, in the laboratory which overlooked the university quadrangle. Its head, spinning at thousands of rotations per minute, was suspended by piano wire from a gas-driven turbine. The instrument was partially surrounded by sand bags with a small peep-hole for viewing. Even today, I can imagine the head coming loose and sailing out the window across the quadrangle, to hit the chapel tower.

Mr. William B. Bell, for whom Duke's Bell Building is named, gave \$2500 for Dr. Beard's salary and \$2500 for laboratory supplies. Mr. Bell was president of the American Cyanamid Corporation, of which Lederle Laboratories was a subsidiary. Lederle wanted a new method of making the horse encephalitis vaccine. In 1938, after successfully making an equine encephalitis vaccine from chick embryos, Dr. Beard, his wife, Dorothy, and I traveled to the Lederle Laboratories at Nyack, New York, to teach them how to do it. Up until then it had been made from horse brains, but a chick embryo would yield about as much virus as a whole brain. The vaccine was on the market for spring inoculation of horses. Unfortunately, several Lederle employees developed encephalitis, and three, I believe, died. Our method of grinding embryos with sand in a hand-held glass mortar and pestle was, to say the least, messy, but we thought the virus was not infectious in humans. Fortunately, the patent held long enough to start the Joseph and Dorothy Beard Foundation. I saw one remarkable thing on the campus of the Lederle Laboratories: literally acres of land were covered with large rabbit hutches, occupied by enormous Belgian hares. The animals were the source of anti-serum used to treat pneumococcal pneumonia. Within a year or so, Domagk's sulfa drugs would shut down this extensive project entirely.

On the way back to Duke, we stopped at the Rockefeller Institute in New York City, so I could visit the tissue culture lab of Dr. Alexis Carrel where Mrs. Beard had worked. Then we went to the Princeton Branch of the Rockefeller Institute where I met Dr. Wykoff and Dr. Wendell Stanley, who later became a Nobel Laureate.

Dr. Beard—aggressive, opinionated and sometimes intolerant of others—was great fun to work with, and the most brilliant person I ever knew. He encouraged me to continue to work in the laboratory and arranged a place for me to work on my return from World War II. Dr. Beard played a significant role in establishing Duke as a major research institution.

Pathology was and still is, in my opinion, the backbone of the surgeon's education. Over the years it has furnished great opportunities for research. My six months on pathology were most profitable, but far too short to get all I wanted from Dr. Wiley Forbus and his staff. He ingrained habits I never lost of attending autopsies and of looking at the microscopic sections of surgical specimens. Surgeons at their core are anatomists with only a veneer of physiology; thick it may be, but anatomy is still the core.

Striving for the Apex

During the 3rd and 4th years of the residency, we spent six months each on neurosurgery and orthopedics. These were by far the best experience of those two years. Neurosurgery became a separate division in 1937, on the arrival of Dr. Barnes Woodhall, another Hopkins graduate. Assigned to his service, I learned to do a craniotomy for extradural hemorrhage, a laminectomy, and to elevate bone fragments for skull fractures. Every general surgeon in the 1930s was expected to know how to manage extradural bleeding from the middle meningeal artery. The neurosurgical rotation was unusually busy, with many very sick patients and no one to "sign out" to. There were a few unpleasant duties, like the many injections of air into the spinal canal for diagnostic radiographs. This gave the patient the world's worst headache, and I was glad, years later, to see the technique superseded by CT and MRI scans.

Orthopedics was an interesting service, but the clinics were exhaustingly long because of the large number of patients, many with chronic osteomyelitis (fractures then were still considered to be the domain of general surgery). Dr. Lenox Baker, a 1934 Duke graduate, trained in orthopedics at Hopkins and then returned in 1938 to succeed Dr. Shands as Chief of Orthopedics. I developed a lasting friendship with Dr. Baker. Dr. Beverly Raney was active on the visiting staff. He was a scholarly and kind gentleman, whom I got to know well as an intern; when he was a Resident for Dr. Shands. Later he became the Chairman of Orthopedic Surgery at the University of North Carolina.

I spent the rest of my time as an assistant resident in general surgery, supervising (to an insignificant degree) the intern. The chain of command tended to go from the Resident to the intern, by-passing the assistant resident. The assistant resident wrote a special note, summarized the patient's hospital stay, performed an occasional herniorrhia

phy, appendectomy, or varicose veins excision, and made many pinch skin grafts (used to treat the large number of burn patients always in the hospital). The assistant resident was not efficiently used, but I had extra time to continue work in the laboratory. My work with papilloma and vaccinia viruses did not result in publications, but my studies of hyperthyroidism with infection on the liver were published.

In the spring of year four, Dr. Hart had to choose one of the two assistant residents to ascend to the pinnacle of the pyramid. I was the fortunate one selected. In my fifth year, as Senior Assistant Resident, I had the chance to serve as surgeon in major operations that were passed down by the Resident or came about when the Resident was away.

The 6th and final year was the reward of competition and waiting. Max Schiebel, the eighth Duke Resident, has published a wonderful account of his experiences as Duke's eighth Resident³. I was the eleventh. James Gifford sums up the Resident's responsibilities on the teaching service in his book, *The Evolution of a Medical Center*. When Dr. Hart was asked what the duties of the Resident were, he said: "[The Resident] was completely responsible for the operations performed on ward patients, and was expected to know when he needed help from the senior faculty. If a man couldn't tell when he needed help, he did not get a residency."⁴

The final year brought an almost overwhelming array of administrative and clinical duties, including long hours in the operating room, either as Dr. Hart's first assistant or as the surgeon operating on a variety of complicated problems. The Resident was responsible for the student schedule, for conducting some teaching rounds, and for arranging Dr. Hart's Saturday Grand Rounds. The Resident made up the house staff rotations and assigned coverage of the ward, operating room and clinics. The day was usually capped off by scheduling the operations for all services for the next day and assigning house officers and students to assist in the operations on general surgery. After this the Resident had to supervise the interns caring for Dr. Hart's patients as well as his own large service.

The Duke residency system meant that ward patients were assured of a competent surgeon. That was not always the case in the 1930s, when many practicing surgeons had three years or less of training. In 1942 the Resident carried out a much broader variety of operations than today, although the magnitude of some was less than now. My experience included many thyroidectomies; a variety of plastic surgery including cleft palate and hare lip repair, skin flaps, etc; radical neck surgery; drainage of lung abscesses and empyema; and gastrointestinal surgery. Often I found myself carrying out the same kind of operation that I had observed as Dr. Hart's first assistant that morning, an incomparable teaching experience. But even in the last weeks of his training, the Resident watched Dr. Hart place every single interrupted fine silk skin suture and tie every single knot. When Dr. Hart was the surgeon, he did the entire operation.

Answering Another Call

An interesting custom brought to Duke from Hopkins was that the Resident's tenure lasted from September 1 until August 31. This allowed the Professor to have an August vacation, with the finishing Resident looking after the service. In my case, however, the pleasant and rewarding experience at Duke Hospital ended abruptly with a call to military duty on July 15, 1942, six weeks before the official end of my Resident year. My military duty began with the 65th General Hospital, staffed with Duke-trained doctors and nurses. I served as Chief of Surgery in several army hospitals including Lawson General Hospital in Atlanta; then, after discharge in 1946, I joined the faculty at Duke University Medical School and the staff of Duke Hospital.

Even in an institution that was clearly dedicated to the Hopkins plan of medical education, Dr. Hart modified Halsted's system of residency training. He kept the pyramid, but added a strict time schedule for finishing. Even before World War II, the emergence of defined surgical specialties had begun to change the system. In the wake of World War II, though, and then the Korean and Vietnam wars, the pyramidal system was finally abandoned, leaving only the requirement of individual responsibility as the remnant of the Halsted system of surgical training. Medicare and Medicaid have removed even this vestige, leaving only the illusion of the resident as responsible surgeon (see my essay entitled *Halsted Is Dead*⁵).

In looking back at my personal experience, I am filled with admiration and appreciation for Dr. Davison, who selected Dr. Hart and the Duke Hospital staff that performed so well in Duke's early years. This great institution survived the Depression and the disruptive years of World War II, and the Korean and Vietnam wars, laying the foundation for its great success and its present place as one of this country's and the world's great medical institutions.

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Credit: Up to 14 hours, Category 1, AMA

Fee: Full: \$325 physicians, \$245 nonphysicians; Friday/Saturday only: \$250 physicians, \$195 nonphysicians; after January 5: \$50 additional

Info: Eastern Virginia Medical School CME, PO Box 1980, Norfolk 23501-19080; Fax 757/446-6146.

January 18-19

Challenges in Geriatric Practice: 12th Annual Conference

Place: The Friday Continuing Education Center, Chapel Hill, NC

Credit: Up to 14.5 hours, Category 1, AMA; up to 17.4 hours ANCC; up to 13.5 continuing pharmaceutical education

Fees: Full: \$195; one day only: \$100

Info: Duke University CME: 919/660-7510; 800/672-4213 (NC only); www.medicine.duke.edu/ADRC/c15.htm.

February 8-9

15th Annual Joseph & Kathleen Brian Alzheimer's Disease Research Center Conference

Place: Durham Marriott at the Civic Center, Durham, NC

Credit: Up to 11 hours, Category 1, AMA

Fees: \$75; \$45 for one day only

Info: Duke University CME: 919/660-7510; 800/672-4213 (NC only); www.medicine.duke.edu/ADRC/c15.htm.

February 16

Race, Class, and Environment: the State of Minority Health

Place: The Friday Continuing Education Center, Chapel Hill

Credit: TBA

Fees: TBA

Info: UNC School of Public Health, 919/966-4032; or www.sph.unc.edu/oce

March 12-16

The Alton D. Brashear Postgraduate Course in Head and Neck Anatomy

Place: Virginia Commonwealth University School of Medicine, Richmond, VA

Credit: 43 hours by the Academy of General Dentistry

Fees: \$450 for practitioners; \$300 for residents

Info: Dr. Hugo R. Seibel, Dept. of Anatomy, VCU: 804/828-9791; fax 804/828-5115

March 29-April 1

American College of Physicians/American Society of Internal Medicine

Place: Georgia World Congress Center Atlanta, GA

Credit: Up to 35 hours, Category 1, AMA

Fees: TBA

Info: ACP/ASIM Customer Service: 800/523-1546 ext. 2600; www.acponline.org

June 11-15

Advanced Cardiovascular Interventions 10th Anniversary Symposium

Place: Westin Resort and Hotel, Hilton Head Island, SC

Credit: Up to 18 hours, Category 1, AMA

Fees: MD/PhD/DO: \$765; others: \$405; after January 31: additional 10%

Info: Carolina Health Care Systems CME: 704/847-8229; email: KingEvents@aol.com

Speaking of Medicine

"A Little Learning ..."

It ain't so much the things we don't know that get us in trouble. It's the things we know that just ain't so.

—Artemus Ward

A man misses a good part of his education who does not get knocked about a bit by his colleagues in discussions and criticisms.

—William Osler

One learns by asking one's self questions, then going out and finding the answers.

—Eugene A. Stead Jr.

Wear your learning, like your watch, in a private pocket; and do not pull it out and strike it, merely to show that you have one.

—Philip Stanhope, Earl of Chesterfield

In the years after medical school, much of what had been regarded as "hard" turned out to be frail or faulty, and much of what had been regarded as "soft" turned out to be durable and essential.

—Norman Cousins

Get accustomed to test all sorts of book problems and statements for yourself, and take as little as possible on trust. The Hunterian "Do not think, but try" attitude of mind is the important one to cultivate.

—William Osler

Knowledge being science and all the accumulated lore you have pumped into you at medical school; science which keeps changing and shifting all through your lifetime, like a snake shedding its old skin.

—Robertson Davies

Knowledge is a sacred cow, and my problem will be how we can milk her while keeping clear of her horns.

—Albert Szent-Györgyi

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Index to Advertisers

CARE	7
Clinic Pro Software	11
Compusystems	back cover
First Citizens	inside front cover
Grubb & Ellis	11
Hope	44
Mag Mutual	29
Med Mutual	inside back cover
Myriad Genetic	28
National Eye Institute	4
NCAPA	26-27
NCMS Endorsed Programs	18
Physician Solutions	2
Ponce Moody Associates	7
PS Medware	1
Reece Conference	25
Sandhills Medical Associates	38
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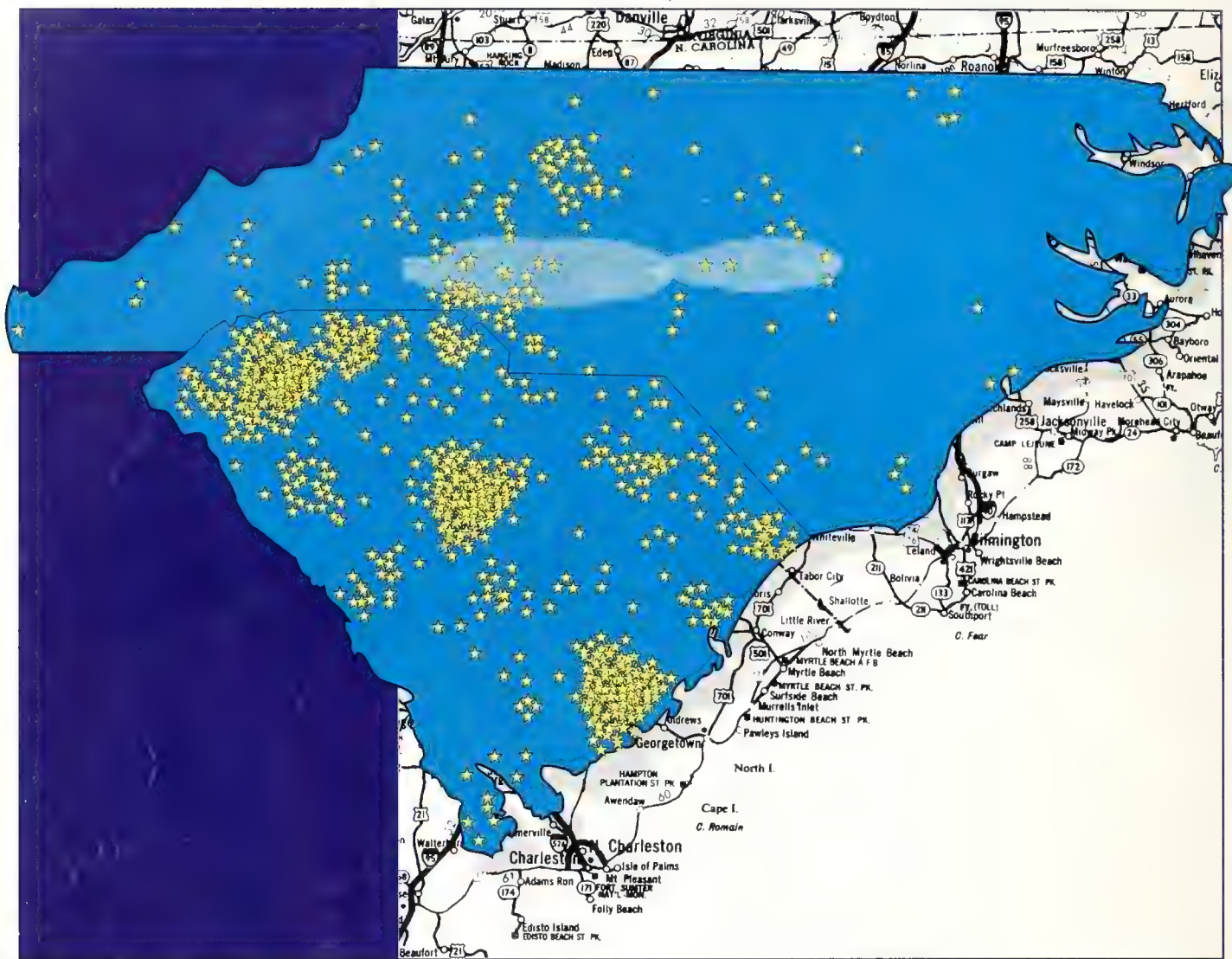
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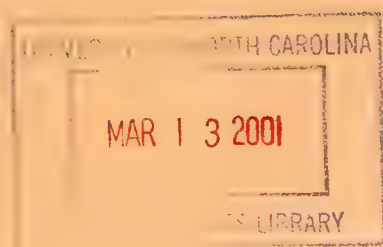
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Volume 62
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North Carolina Medical Journal

For Doctors and Their Patients


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HISTORY OF MEDICINE

- 66 The Original Siamese Twins: We Know Why Chang Died, But Why Did Eng?
Eben Alexander, Jr., MD

DISEASE MANAGEMENT

- 69 Hospital Interventions Improve Care of North Carolina Medicare Patients with Acute Myocardial Infarction
Carla A. Sueta, MD, PhD, Anna Schenck, PhD, Randa Hall, MBA, MSHA, and Ross J. Simpson, Jr., MD, PhD
- 74 Urinary Incontinence: No Need To Be Wet and Upset
Joseph M. Khoury, MD, FACS

A PIECE OF A NORTH CAROLINA DOCTOR'S MIND

- 78 Doctor [fr. Latin *docere*, to teach] *n.* A person trained in the healing arts
Michael E. McLeod, MD

CASE REPORT

- 82 A Rare Congenital Condition Discovered (Happily) Late in Life: Tetralogy of Fallot with Absent Pulmonary Valve
Scott M. Hovis, BS, John D. Rose, MD, Vincent L. Sorrell, MD

DIMENSIONS OF DOCTORING

- 86 Hospice: Care When There Is No Cure
Janet K. Horton, MSIV
- 91 The Charms of Music: Step by Step Prescription for Patients
Matthew Alexander, PhD

MIND AND BODY

- 95 Depression and Vascular Function in Older Adults: Evaluating the Benefits of Exercise in a New Study at Duke University
James A. Blumenthal, PhD, Alisha Hart, PhD, Andrew Sherwood, PhD, Murali Doraiswamy, MD, Steve Herman, PhD, Lana Watkins, PhD, Alan Hinderliter, MD, Elizabeth Gullette, PhD, and K. Ranga Krishnan, MD

SEQUELAE

- 99 Health and Social Problems of a Primary Care Clinic Population After Disaster: the Hurricane Floyd Flood
Matthew D. Curry, MA, RN, Christopher J. Mansfield, PhD, Kathleen D. Leonardo, BSN, RN
- 104 Esse Quam Videri: Never More True
David A. Tate, MD
-

BULLETIN BOARD

- | | | | |
|-----|------------------------|-----|---------------------------|
| 62 | Letters to the Editor | 108 | Classified Advertisements |
| 64 | Running the Numbers | 109 | Instructions to Authors |
| 80 | NCMS Endorsed Programs | 110 | CME Calendar |
| 106 | New Members | 112 | Aphorisms |
| | | 112 | Index of Advertisers |

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Letters to the Editor

To the Editor:

The North Carolina Medical Journal provides a chronicle of medicine as it's practiced in North Carolina. Current budget woes withstanding, I hope that the Journal will continue to publish in the electronic format. In my opinion, our younger physicians will prefer this format. Thank you for continuing this effort.

Charles F. Willson, MD
Brody School of Medicine, ECU
Greenville, NC

To the Editor:

I am currently working on what I hope will become a comprehensive list of economic analyses of HIV/AIDS treatment in the United States, for the Center for Health Economics at the Medical University of South Carolina. We would like to include the article "AIDS and money: where do the authors tgo from here?" (Engel J. NC Med J 1998;59:344-7). Thank you in advance for your assistance.

Elinor Chumney, MSc
Medical University of South Carolina
Charleston, SC

To the Editor:

Robert Wood Johnson Medical School and Medical Communications Media are developing a multimedia educational program. The intent is to offer an accredited CD-ROM program to doctors, nurse practitioners, and physicians assistants. We estimate that approximately 19,500 copies of this program will be distributed to members of the American College of Physicians, the American Association of Family Physicians, the American Academy of Physicians Assistants, the American Academy of Nurse Practitioners, Pri-Med East, Pri-Med south, and Pri-Med Mid West.

We would like to include on the disk entitled The Role of Hormone Replacement Therapy in Women's Health the article by Ann Brown ("Postmenopausal hormone replacement therapy information for effective counseling" NC Med J 1997;58:411-419). Thank you in advance for your time and consideration.

Sue Dow
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Running the Numbers

A Periodic Feature to Inform North Carolina Physicians and Their Patients
About Current Topics in Health Statistics

Paul A. Buescher, PhD, Editor

Health Risks in North Carolina's Adult Population

Personal behaviors contribute importantly to the health status of a population. In North Carolina we can assess health risks in adults through the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is sponsored by the Centers for Disease Control and Prevention (CDC) and is carried out in all 50 states. In North Carolina, the Center for Health Informatics and Statistics is responsible for the operation of this survey. The BRFSS is a random telephone survey of persons age 18 and older across the state. Approximately 3,000 interviews, each about 25 minutes long, are done each year. The responses are weighted so that the results are representative of the entire adult population of North Carolina.

The BRFSS asks a variety of questions about behaviors and health issues that affect the major causes of illness and death. Topics covered include perceived health status, health insurance, use of preventive health care, oral health, smoking, physical activity, diet, weight, health screening, use of birth control, seat belt use, and disability. For selected items, the percentages of respondents reporting the risk factors are shown here. Unless otherwise specified, the data are for the period 1997-1999. Further tabulations of the data by age, race, sex, or other factors reveal substantial variation in risks across various sub-groups.

A limitation of the BRFSS data is that they are based on self-reporting by the respondents. Problems of recall and the tendency to report socially acceptable behaviors may affect the results. Also, persons without telephones are not included in the BRFSS. Persons without telephones are more likely to have lower incomes or to be unemployed, and therefore the BRFSS may under-estimate the prevalence of certain risk factors.

One strength of the BRFSS is that new data are available on an annual basis. This makes the BRFSS a useful tool for monitoring changes in health risks in the adult population of North Carolina, and for measuring the effectiveness of statewide health improvement programs. Also, with a similar design and a standard set of core questions across all states, comparisons can be made to other states or to the nation as a whole for many of the measures. The CDC web site provides state and national prevalence data, as well as other useful information about the BRFSS: <http://www.cdc.gov/nccdphp/brfss>.

	Percent
Health was fair or poor	16.9
No health care coverage	13.0
Needed to see a doctor during the last 12 months but could not because of cost	12.3
Did not visit a doctor for a routine checkup in the past 2 years	13.7
Ever told by doctor that they had diabetes (excluding women told only during pregnancy)	5.8
One or more permanent teeth removed because of decay or gum disease (1999)	71.0
Current smoker	25.2
No physical activities or exercise in past month (1998)	27.7
Overweight	58.4
Ever told by a doctor that they had high blood pressure (1997 & 1999)	23.7
Never had their blood cholesterol checked (1997 & 1999)	23.6
Among sexually active women, percent who are not using birth control now (1999)	30.3
Women age 50+ who did not have a mammogram within the past 2 years	22.0
Women age 18+ who did not have a Pap smear within the past 2 years	14.2
Did not always use seatbelts when driving or riding in a car (1997)	15.2
Ever told by a doctor that they had arthritis (1998)	22.6
Ever forced (or force attempted) into unwanted sexual activity (1997 & 1999)	11.0
Some type of disability (self-perceived, activity limitation, special equipment, problem learning, etc.) (1998-1999)	22.0

Note: Data are for 1997-1999 unless otherwise specified.

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The Original Siamese Twins

We Know Why Chang Died, But Why Did Eng?

Eben Alexander, Jr., MD

The 19th-century history of North Carolina and southeast Asia are linked in an unusual way. The "Siamese Twins," Eng and Chang, were born on a houseboat in the Mekong Delta south of Bangkok, Thailand, in 1811. They were connected at the xiphoid by a band of tissue just a few inches long. They were bright children, and as they grew and became more active, the band stretched; they became quite athletic and able to swim, run, and climb ladders. They were labeled the "Siamese Twins" by the great circus exhibitor, P T Barnum, because their mother was Thai (their father was Chinese). The following is a recapitulation of their story for the benefit of those who are not familiar with these twins.

A Brief History

In the 16th and 17th centuries, the birth of conjoined twins was considered an ill omen in countries whose monarchs felt that this represented displeasure by the gods. The punishment for the "monsters" was death. The king of Thailand, however, after visiting with Eng and Chang, ordered that they not be put to death; they were free to live and move about. They eventually came into contact with a Scotch-Irish entrepreneur, Captain Abel Coffin, who persuaded them and their mother to let him take the twins to America.

For years they were exhibited the world over; they made a good deal of money in the process of being exhibited in New York, Philadelphia, Richmond, and various countries in Europe, including Britain, France, Prussia, and Germany (Fig. 1). In the course of their travels, they visited eminent physicians and surgeons, including the famous Rudolf Virchow, father of modern pathology. All these consultants concluded that separation of the twins would be fatal to both.

Dr. Alexander is Professor Emeritus of Neurosurgery, Wake Forest University School of Medicine, and an Associate Editor of the Journal. He can be reached at eaalexand@wfubmc.edu

At the age of about 30, the twins came to North Wilkesboro, NC, where they met two sisters, whom they married. Between them they fathered 21 children. They became naturalized citizens and took the name "Bunker." They kept two homes, two or three miles apart, at White Plains, NC (near Mount Airy), and would regularly spend three nights in one and three nights in the other. They prospered and, in fact, owned slaves before the Civil War. After the war, they were affected by the poverty of the South and their money was virtually worthless.

The Demise of Chang, Then Eng

Chang, the smaller of the twins, on the left side of Eng, became an alcoholic and suffered a stroke, which severely disabled him. He was paralyzed on his right side, so Eng was limited as well as Chang. One night, when they were about 60 years old, Chang, who had not been well, died in bed. Their doctor, Joseph Hollingsworth, had agreed that he would come to cut the joining band when one died. However, because of difficulty in traveling, he did not reach the home until several hours after Chang's death. Eng gradually sickened over the next three or four hours, and died.

It was very cold in Mount Airy when the twins died, and they were buried in a sealed coffin deep under ground. About two weeks later, with the permission of the wives, the bodies of Eng and Chang were transported to Philadelphia, where Dr. William H. Pancoast and Dr. Harrison Allen performed an autopsy. Their findings, reported in *Surgery, Gynecology and Obstetrics*, (now the Journal of the American College of Surgeons),¹ did not show why the patients died. However, the opinion ascribed to Drs. Hollingsworth, Pancoast, and Allen was that Chang had died of vascular difficulties associated with his stroke, and Eng had died of "fright." This was not a universal opinion, however. Irving and Amy Wallace, in their thoroughly researched book entitled "The Two,"² mention Isaac Armfield, a friend of Eng's who had

helped Eng's wife, Sally, after the twins had died. Armfield was asked if it was his opinion that Eng had died of shock or fright occasioned by his brother's death. "No, sir, it is not," said Armfield with certainty. He had his own view of Eng's death: "I am as well satisfied that blood flowed from one to the other through that connecting ligament as that the same blood flows in my right and left arm."

In point of fact, the physicians who performed the autopsy in Philadelphia concluded that they did not know why Eng died, although some said it was due to "fright." An autopsy aide by the name of Nash (not a physician), "... who was a very rough but also quite privileged character ... bluntly informed them that there was no room for discussion—that the cause for [Eng's] death was plain—that he bled to death."¹

Exsanguination Without Bleeding

The most extensive study of conjoined twins, particularly of *craniopagi* (those joined at the head), was published in Neurosurgery by Dr. Kenneth R. Winston. Winston says: "It has been repeatedly observed in conjoined twins the death of the second twin follows shortly the death of the first probably due to unrestricted shunting of blood into the dead twin who has no vascular tone and who returns little or none of the blood. The result is a severe reduction in circulating volume in the surviving twin (i.e., the death of the second twin by exsanguination)."³

The autopsy did show the livers of the two twins to be connected by a very narrow neck in the ligament between them. There was also a tongue of peritoneum, as well as hypogastric artery and vein. The blood flow through these vessels was probably not large, because when Chang got drunk Eng was not affected, and they did not always suffer the same illnesses. In fact, it is reported that a physician in France had surreptitiously given one of the twins, but not the other, a diet of asparagus. The odor of methyl-mercaptan (so often found in the urine after eating asparagus) was missing from the urine of the twin who had not had the asparagus. The vascular connection between the two may not have been very large, but we know that Eng's heart was still beating after



An idealized drawing of Eng and Chang at the age of 18 on their first visit to England in 1829. Their connecting band and common navel are plainly visible. Drawing by H. Berthoud.

Chang's had stopped, and the connection was sufficient to let Eng's blood drain away over the two to four hours it took him to die. It seems clear: Eng died of blood loss.

Separate Ways

Doctors in the 19th century had no roentgenograms or other sophisticated tools with which to examine the circulatory system. But from the autopsy findings, it appears that all the eminent consultants of the 19th century were wrong; it is obvious Eng and Chang could have been separated easily, just by cutting the 7-inch band connecting them.

Norwitz, et al⁴ recently reported the complex separation of conjoined twins, only one of whom had a functioning heart—and who survived the operation! We can expect that the separation of such "monsters," now called conjoined

twins, will be more often attempted, with survival of one or both. The British Medical Journal⁵ noted the case of conjoined twins, born recently in Italy and brought to England for surgery. One child had a normally functioning brain and heart, but the other was defective and did not have a functioning heart. Separation was recommended because, without it, both twins were predicted to die in a few months. Unfortunately, separation produced the anticipated outcome: the stronger twin lived but at the sacrifice of the other. The Catholic parents had objected to the complex operation, for fear of such an outcome, but the British Court of Appeal decided the twins should be separated over their objection. Medicine, with its great promise and progress, has created complex problems in which society has an intimate stake. None of this was even dreamed of when the Siamese twins died in 1872 in White Plains, North Carolina.

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Hospital Interventions Improve Care of North Carolina Medicare Patients with Acute Myocardial Infarction

Carla A. Sueta, MD, PhD, Anna Schenck, PhD, Randa Hall, MBA, MSHA, and Ross J. Simpson, Jr, MD, PhD

The analyses upon which this publication is based were performed under Contract No. 500-96-P613 entitled "Operation of Utilization and Quality Control Peer Review Organization (PRO) for the State of North Carolina," sponsored by the Health Care Financing Administration, Department of Health and Human Services. The conclusions and opinions expressed, and methods used herein, are those of the authors. They do not necessarily reflect HCFA policy.

Cardiovascular disease is the most common cause of death in all states.¹ In North Carolina in 1998, myocardial infarction accounted for 11,914 hospitalizations of patients 65 years old or older.² Myocardial infarction not only has a high inpatient mortality rate (12%²), but it is one of the conditions commonly leading to readmission within 30 days of hospital discharge. In this paper we describe the impact of hospital interventions designed to improve the treatment of North Carolina Medicare patients hospitalized for acute myocardial infarction.

In 1995, the Health Care Financing Administration (HCFA) launched its first nation-wide health care quality improvement project, called the Cooperative Cardiovascular Project (CCP). CCP examined the quality of care given to patients with acute myocardial infarction across the US. Seven quality indicators of care were chosen, to reflect measurable processes of care based on guidelines developed by the American College of Cardiology and the American Heart Association:³ reperfusion of the coronary vessels with thrombolytic drugs or angioplasty; use of aspirin during hospitalization and at discharge; use of beta-adrenergic receptor blocking drugs at discharge; counseling about smok-

ing cessation; and, in patients with low ejection fraction, use of angiotensin converting enzyme inhibitor (ACEI) drugs, and avoidance of calcium channel blocking drugs.

Medical Review of North Carolina, Inc. (MRNC), the state quality improvement organization, helped hospitals find ways to improve the care of North Carolina Medicare patients hospitalized because of acute myocardial infarction. MRNC invited hospitals to participate in the CCP, sent hospitals guidelines for treating acute myocardial infarction, and solicited the development and submission of improvement plans addressing one or more of the quality of care indicators. We describe here the baseline statewide rates of performance in regard to these indicators, and how performance changed over time.

Methods

Study Sample. In collaboration with MRNC, 60 North Carolina hospitals agreed to submit a hospital improvement plan. Patients admitted to those hospitals with acute myocardial infarction were identified by information in the Medi-

Drs. Sueta and Simpson are Clinical Coordinator and Principal Clinical Coordinator, respectively, of Medical Review of North Carolina (MRNC). They are both in the Department of Medicine at UNC Chapel Hill. Dr. Schenck and Ms. Hall are with MRNC. Address correspondence to Dr. Sueta at MRNC, PO Box 37309, Raleigh, NC 27627. Phone 919/851-2955.

Table 1. Characteristics of patients studied in the North Carolina Cooperative Cardiovascular Project

	Percentage of patient with characteristic	
	At baseline (n=5,674)	During intervention (n=2,936)
Age		
<65 years	11%	10%
65-74 years	44%	40%
75-84 years	34%	35%
85 and older	11%	14%
Women/men	47/53%	48/53%
African-American	15%	17%
Medical history		
Prior myocardial infarction	65%	64%
Coronary artery bypass graft	12%	13%
Congestive heart failure	24%	24%
Hypertension	63%	65%
Diabetes	33%	34%
Chronic lung disease	23%	24%
Current smoker	16%	13%

care National Claims History File. Inclusion criteria required that the principal discharge diagnosis be listed as acute myocardial infarction (ICD-9-CM code 410) and that the presence of myocardial infarction be confirmed by chart audit showing elevated serum levels of the myocardial isoform of creatine phosphokinase (CPK-MB) or at least two of the following criteria: chest pain, a two-fold rise in serum total CPK, an elevated serum level of lactate dehydrogenase (with LDH1 > LDH2), or evidence of an acute myocardial infarction by electrocardiogram. Baseline data were collected on patients discharged between February 1, 1994 and July 31, 1995, and evaluation phase data were collected on patients discharged between September 1, 1996, and December 31, 1997. During the baseline period, 5,674 charts were abstracted (100% of eligible patients); during the evaluation period, 2,936 medical records were abstracted (representing 100% of eligible patients from small hospitals and a random sample of patients from large hospitals). All charts were photocopied and abstracted using standard techniques by DynKePro, York, PA.

Data are presented in this article as the percentage of "ideal" patients who receive therapy. By "ideal" we mean patients whose charts document no contraindications to the guideline-recommended drug or other interventions. A detailed description of ideal candidates for the quality indicators has been published.⁴

Intervention: All hospitals received the Executive Summary and the unabridged Guidelines for the Management of Patients with Acute Myocardial Infarction published by the

American College of Cardiology and the American Heart Association in November, 1996.⁵ Of the 60 hospitals in our study, 39 (65%) sent representatives to one of three MRNC-sponsored conferences held to familiarize them with the background and plans for CCP. As part of these conferences, collaborators were given reports containing hospital-specific and comparative data for each of the seven quality indicators at baseline. Hospitals chose the quality indicators on which they would focus, then each submitted an improvement plan, which was reviewed and approved by the physician coordinator and staff at MRNC. MRNC gave each hospital an abbreviated chart abstraction instrument with which to collect data related to the care of patients with acute myocardial infarction and to help hospitals monitor their ongoing performance. All hospitals in the study received evaluation reports from MRNC comparing their progress from baseline

to the evaluation period.

Each hospital chose to focus on certain of the quality indicators, but most (88%) either disseminated baseline data on *all* of the quality indicators to their staff, or they created or revised standing orders, which included most of the indicators. All of the hospitals received the AHA guidelines, and all received formal reports on all indicators at baseline. Because these factors could affect all the quality indicators, we did not perform separate analyses according to hospitals which had selected a particular group of indicators. Instead, we examined aggregate data for all hospitals.

Statistical Analysis: Using SAS®, we compared care during the baseline and intervention periods using logistic regression analyses controlled for age, race, gender, and time. We calculated odds ratios and the 95% confidence intervals for those ratios to measure the strength of association between improved care and the intervention. These odds ratios represent the likelihood that patients received a given guideline-recommended treatment during the intervention period compared to the likelihood during the baseline period. An odds ratio greater than 1.0 means that the therapy was more likely to be given during the intervention, and a ratio less than 1.0 means that the therapy was less likely to be given during the intervention. When the 95% confidence limits do not include 1.0, the odds ratio is statistically significant.

In an attempt to determine whether the observed changes might reflect just general (historical) trends in care rather than the intervention itself, data were analyzed over time. Because of sparse data in some quarters, data were collapsed

into five time periods for the baseline and evaluation periods. Rates of adherence to the guidelines were calculated for each time period and the data presented graphically.

Results

Patient characteristics were similar in the baseline and evaluation periods (Table 1). Most patients were between 65 and 75 years old; about half were women, and 16% were African-American. Hypertension and diabetes were common co-existing diseases. Each hospital focused on an average of three quality indicators. Hospital interventions included disseminating information to medical and nursing staff (82%), creating or revising standing orders (65%); medical education of the staff (37%); and using educational brochures or videos (7%). Over half of hospitals (55%) carried out follow-up monitoring.

Table 2 illustrates the percentage of ideal patients who received the recommended quality indicator interventions, and the likelihood of receiving them during the intervention compared to the baseline periods. During the intervention phase, patients were less likely to get coronary reperfusion or counseling about smoking cessation than during the baseline period. Patients were significantly more likely to receive aspirin during hospitalization; to be discharged on aspirin, beta blockers, and ACEI; and not to receive calcium channel blockers in the evaluation phase. Three of the five quality indicators that improved during the intervention are shown in Figures 1-3. The percentage of patients who were discharged on beta blockers, aspirin, and ACEI appeared relatively constant over the baseline time period, and all three showed increased use during the intervention phase. However, all three showed some attenuation of use during the intervention, consistent with a waning intervention effect.

Discussion

Our results demonstrate that hospital-based interventions can achieve widespread improvement in the management of

Table 2. Quality indicator use in study patients who were ideal candidates

Quality Indicator	Baseline		Intervention		Odds Ratio
	%	n	%	n	
In hospital					
Coronary reperfusion	56	559	49	326	0.74 [0.56-0.99]*
Aspirin	88	2228	91	1268	1.45 [1.14-1.83]
At Discharge					
Aspirin	83	1476	88	755	1.34 [1.03-1.75]
Beta blocker	55	334	76	125	2.73 [1.68-4.43]
ACE inhibitor**	61	571	71	241	1.57 [1.24-2.19]
No calcium channel blocker**	78	272	89	156	2.38 [1.31-4.34]
Smoking cessation counseling	42	925	35	382	0.72 [0.56-0.93]

*95% Confidence interval in brackets.

** If ejection fraction low.

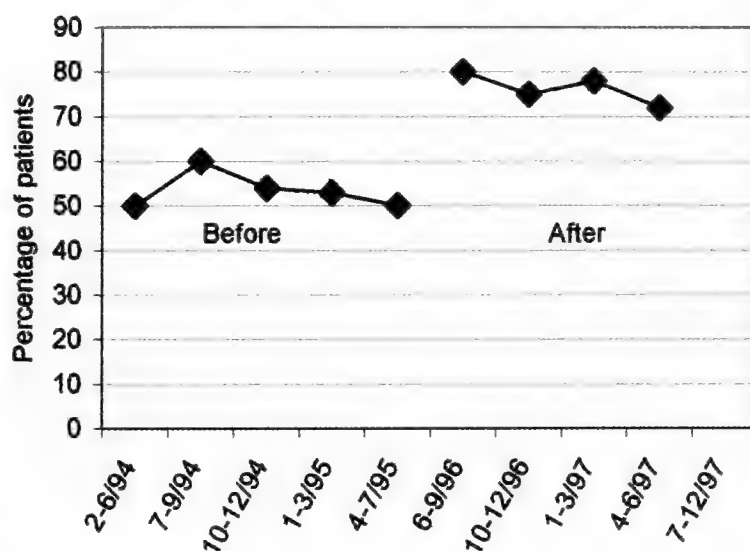


Figure 1. Percentage of patients discharged with prescription for beta blocker, before and after intervention. (There were no observations made during the final period of the intervention.)

patients with acute myocardial infarction. There was significant improvement in five of the seven quality indicators examined. Discharge on beta blocking drugs showed the most dramatic improvement (Figure 1), and the odds that a patient discharged during the intervention phase would receive a beta blocker were nearly three times higher than for patients discharged in the baseline phase (Table 2). Krumholz et al confirmed that beta blockade decreased mortality in older patients who made up the national cohort of patients followed in CCP.⁶

Giving aspirin during infarction and continuing it afterwards significantly reduces mortality and recurrent ischemic events.⁵ In our study, aspirin use during hospitalization increased from 88% of patients at baseline to 91% at intervention; aspirin prescription at discharge improved from 83% to 88% (Figure 2). Aspirin use during hospitalization is a strong

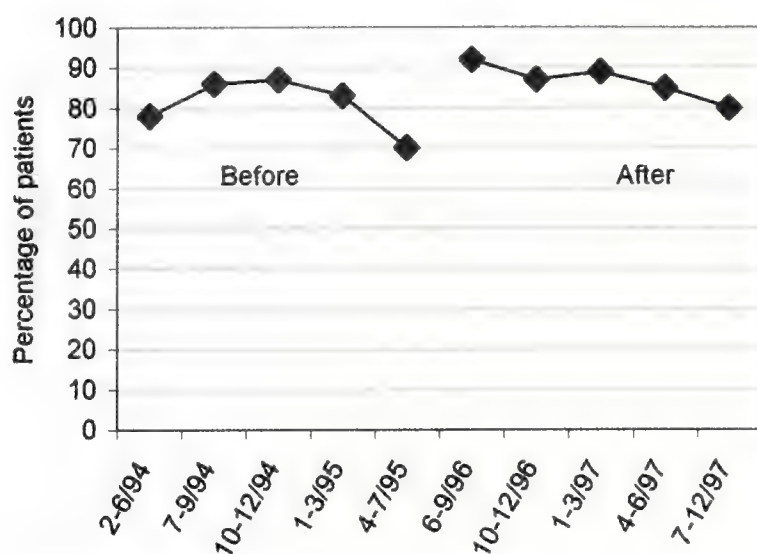


Figure 2. Percentage of patients discharged with prescription for aspirin, before and after intervention.

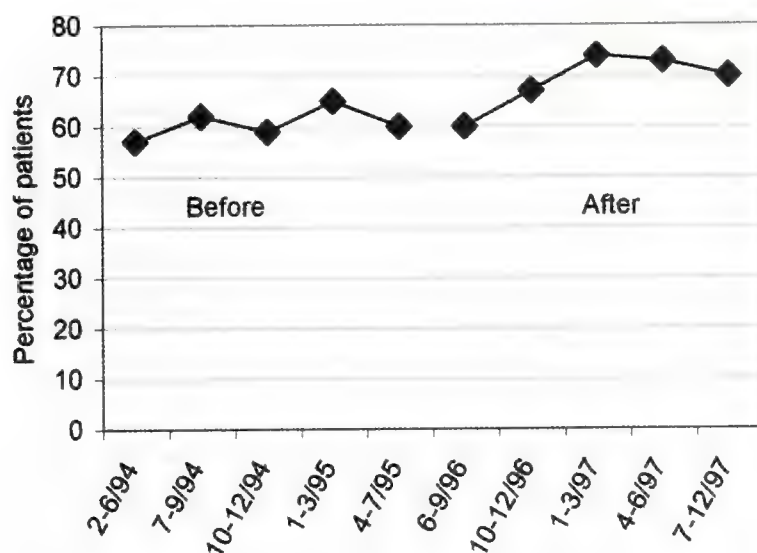


Figure 3. Percentage of patients discharged with prescription for angiotensin converting enzyme inhibitor, before and after intervention.

predictor of prescription at discharge.⁷

ACEI therapy decreases mortality, re-infarction rate, and re-hospitalization of patients with an acute myocardial infarction and left ventricular ejection fraction under 40% (normal, >55%).⁸ The use of ACEI in ideal candidates was initially 61%, and increased to 71% during the intervention period. Conversely, calcium channel blockers should not be given to patients with acute myocardial infarction and low ejection fraction. During the baseline period, 78% of patients were not on calcium channel blockers at discharge, and this increased to 89% during the intervention.

The hospital interventions put in place did not improve

all quality indicators across the board. Reperfusion therapy (either thrombolytic therapy or angioplasty) was given to 65% of patients at baseline and 49% after intervention. Gurwitz et al reported that use of thrombolytic therapy was inversely related to patient age, but use of thrombolytic therapy increased between 1990 and 1994, especially among the oldest age groups.⁹

Unfortunately, we found that counseling patients to stop smoking declined significantly from 42% at baseline to 35% after intervention ($p < 0.05$). Smoking constricts coronary arteries, blunts the beneficial effects of beta blockers, and doubles mortality after acute myocardial infarction.¹⁰⁻¹² Unlike drug utilization indicators, which are documented in the physician orders, smoking cessation counseling can be carried out but not documented in the chart. However, it is not clear why documented advice to stop smoking should have declined during our study.

There are several limitations to this study. It is possible that the changes observed would have occurred without the intervention. However, none of the seven quality indicators were considered experimental, even at the start of the baseline period. During the CCP period, no landmark studies were reported that might have led to the observed changes. Our data on drug utilization over time (Figures 1-3) show that the time trends before intervention appear flat for 6 of the 7 quality indicators. After the intervention there was an increase in rates of appropriate drug prescription, which appeared to attenuate over time. Marciniak et al⁴ found that the rate of discharge on aspirin and beta blocking drugs, and the rate of smoking cessation counseling, were significantly higher in states that participated in a pilot trial of CCP, compared to the rest of the nation. Our data do not allow us to decide which, if any, of the multiple interven-

tions had the most impact on the management of patients admitted with acute myocardial infarction.

Overall, the clinical care provided by North Carolina hospitals to Medicare patients admitted with acute myocardial infarction improved significantly during the Cooperative Cardiovascular Project. It is not possible to evaluate the effectiveness of a specific hospital-based intervention, but our data suggest that a multifaceted approach is sensible. Much improvement is still needed, but the fact that quality of care can be enhanced through simple, hospital-based interventions should encourage all hospitals to develop such strategies. The fall-off in the prescription of aspirin and beta-

blocking drugs over time (see Figures 1 and 2) suggests that the interventions should be system-based, continuously monitored, and reinvigorated as needed. The Medical Review of North Carolina continues to support and work with hospitals to advance the quality of care of Medicare patients.

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Urinary Incontinence

No Need to Be Wet and Upset

Joseph M. Khoury, MD, FACS

Urinary incontinence (UI) afflicts more than 17 million people in the United States. It is one of our ten most common chronic medical conditions (along with bronchitis, asthma, diabetes, and ulcer disease), and afflicts people of all ages.¹ Unfortunately, many people—both doctors and patients—are so embarrassed and uncomfortable about discussing UI that the issue is usually ignored or dismissed with a mere recommendation to “wear pads.” This is too bad, because, like many medical conditions, UI can be significantly improved or even cured by appropriate evaluation and treatment. Because health care professionals have the opportunity to address quality-of-life issues with their patients, this article seeks to heighten awareness of UI among them and enable them to speak comfortably and knowledgeably about it with their patients.

The Scope of the Problem

Some 20-30% of ambulatory older adults (over 60 years of age) have some degree of UI; it is twice as common in women as in men. The prevalence rises to more than 60% in seniors living in nursing homes. In fact, urinary and fecal incontinence (which occurs in 10-20% of those with UI) are the main reasons for admission to assisted living and skilled nursing facilities in the US.¹

By limiting the sufferer's willingness to engage in daily activities, UI produces a significant physical, emotional and social dysfunction. The symptoms of frequency, nocturia, urgency, and urge incontinence can be just as debilitating as—and have a greater impact on routine activities than—diseases like multiple sclerosis, diabetes and congestive heart failure.^{2,3} Furthermore, UI leads, directly or indirectly, to medical problems such as urinary tract infection and derma-

titis; it prolongs hospital stays; the need to urinate at night leads to falls and fractured hips with all their orthopaedic sequelae. This often misunderstood symptom leads to psychosocial problems such as anxiety, isolation from family and friends, and depression.

The economic impact of UI is astounding. In 1995, \$30 billion was spent, directly or indirectly, on this problem in the elderly.⁴ Ten billion dollars alone went for routine care products such as sanitary napkins, pads and diapers! Because these products are not reimbursed by insurance companies, their purchase can be a significant financial burden to elders on fixed incomes. In sharp contrast to the mundane costs of care, less than \$1 billion was spent in 1995 on evaluation and treatment of UI. Many managed care companies refuse to pay for behavioral treatments like pelvic floor reeducation using vaginal biofeedback, or electrical stimulation, although they may certify surgery. These restrictions often limit the options presented to the patient.

Evaluating the Patient with UI

Evaluation should begin with a thorough questioning about the number of times the patient voids (day and night), the presence of urgency, dysuria, and voiding symptoms like hesitancy, intermittency, weak stream, or need for Valsalva maneuver to induce voiding. The patient should be asked if incontinence occurs with coughing, laughing, or walking (“stress incontinence”), or if it accompanies an urgent need to void with inability to make it to the bathroom in time (“urge incontinence”). Questions about the number of perineal pads used can help define the magnitude of the problem. I find it helpful to ask: “How many pads do you wear during the day?” and “Are they dry, damp or wet?” The answers give me an idea of the severity of leakage and provide a benchmark to assess whether treatment leads to improvement. Inquiries about prior urinary tract infections, hematuria, or stones will help determine whether incontinence is secondary to an underlying problem within the urinary tract.⁵

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Table. The types of urinary incontinence

Stress Incontinence	The result of (1) weakness of the pelvic floor, which allows the proximal urethra and bladder base to be pushed out of the pelvis during periods of increased abdominal pressure resulting in leakage or (2) inherent weakness within the urethra, which results in loss of appropriate urethral coaptation and compression.
Urge Incontinence	The result of (1) an overactive bladder, causing involuntary detrusor (bladder muscle) contractions or (2) elevated detrusor storage pressures during bladder filling (common in neurogenic bladder).
Overflow Incontinence	The result of (1) bladder outlet obstruction (low flow rate with high bladder pressure) or (2) a weak bladder muscle (low flow rate with low bladder pressure). Both lead to incomplete bladder emptying.
Total Incontinence	The result of injury to the bladder or ureters leading to uretero-vaginal or vesico-vaginal fistula with leakage of urine into the vagina. Such fistulas can occur after hysterectomy, colorectal surgery, pelvic radiation or other types of pelvic surgery.
Functional Incontinence	The result of cognitive impairment or physical disability that impairs the ability to respond appropriately to the cues to void. This type of leakage may accompany stroke or severe dementia.

The review of systems should include questions about lower gastrointestinal symptoms such as fecal leakage, incomplete bowel evacuation, constipation, and fecal impaction because these can predispose to urinary frequency and incomplete bladder emptying. Neurological symptoms such as paresthesia, motor weakness, or back and hip pain may indicate radiculopathy, and the presence of neurological disease such as stroke, multiple sclerosis, spinal cord injury, or Parkinson's disease may provide the explanation for a patient's urinary leakage. The peripheral neuropathy that accompanies diabetes mellitus may be responsible for lower urinary tract symptoms such as frequency, urgency, or impaired sensation of bladder filling. Women should be asked about parity, complications during childbirth, menopause, and pelvic surgery such as hysterectomy, bladder suspension or vaginal reconstruction for prolapse.

Dietary and social habits may produce urinary symptoms.⁶ Caffeinated, carbonated, or alcoholic beverages as well as acidic and spicy foods may irritate the bladder. So may cigarette smoking, which also poses a significant risk factor for bladder cancer.

Prescription medications such as narcotics, sedatives, antidepressants, diuretics, and antihypertensives, and over-the-counter remedies like antihistamines and decongestants may induce urinary incontinence and voiding dysfunction. Many patients turn to herbal remedies like Saw Palmetto for prostate disorders, and vitamins and amino acids (l-arginine) for bothersome bladder symptoms. These may be helpful, and their use indicates that the patient has a problem or is worried about one.

The Physical Exam

Physical examination begins as the patient walks into the examination room. Gait disturbances may indicate a neurological disorder such as stroke or Parkinson's disease, or a functional reason underlying the incontinence. All patients should have an abdominal examination searching for masses and the presence of fecal impaction. Women should undergo a split-speculum vaginal exam to detect prolapse of the anterior vaginal vault (cystocele), posterior vault (rectocele), or midcompartment (uterine prolapse or, if the patient has had a hysterectomy, a weak vaginal cuff). Estrogenization of the vaginal vault should be assessed because atrophic vaginitis may lead to frequency, urgency, dysuria, and incontinence. A sensory examination of the perineal dermatomes (S2-4) may uncover an underlying neuropathy. Finally, a rectal examination to evaluate rectal tone, voluntary sphincter control, and the presence of fecal impaction completes the evaluation. In men, it is important to note size, nodularity, lobar asymmetry, and firmness of the prostate gland.⁵

It is important to measure residual urine in the bladder after voiding. This may be done with "in-and-out" catheterization, or bladder ultrasound can be used to estimate residual volume. The latter is painless, quick and obviates the risk of urinary infection. A midstream urinalysis is obtained on every patient: concentrating ability is estimated from the specific gravity and from the presence of glucose, red or white blood cells; bacteruria may provide a potential etiology of voiding dysfunction or incontinence.

I ask patients to keep a three-day voiding diary for

mutual review. Daily intake and output, usually measured in ounces, is recorded as well as the time of each voiding. I ask patients to indicate the number and magnitude of leakage episodes per day to give us a concrete understanding of the problem.

Treatment of UI

A careful examination coupled with the simple testing procedures outlined above should provide most of the information that will allow categorization of the patient's incontinence into one of several etiological categories (Table). Thereafter, treatment may begin using one of a number of different modalities tailored to the diagnosis.

Behavioral Techniques. A number of simple changes in lifestyle may help patients cure or at least lessen their urinary problems. I ask patients to limit foods that are associated with bladder irritability. I give them a list of foods, not to be eliminated entirely, but to serve as a reference in case new foods introduced into the diet lead to new or worsened symptoms. Reducing the amount of caffeine and alcohol or changing the time of dosing for certain medications may improve symptoms.⁶

Many patients void infrequently, then have difficulty getting to the bathroom in time. Scheduled or timed voiding (every two to three hours) can significantly reduce or abolish episodes of incontinence. Patients in a nursing home who are prompted to void every two hours by a staff member can reduce leakage episodes by 50%.⁷

In mild cases, stress or urge incontinence can be improved by pelvic floor muscle strengthening exercises (Kegel exercises), which increase the bulk and strength of the pubococcygeus (PC) muscles. These pelvic muscles, which may atrophy after menopause or childbirth, help support the bladder and proximal urethra complex, uterus and rectum.^{5,6,8} In patients who have difficulty recognizing contraction the PC muscles, biofeedback training (neuromuscular re-education) may help. This strategy is often used for women with stress or urge incontinence. I use surface electrodes placed on the abdominal wall and a vaginal sensor, both of which are connected to a computer. The apparatus allows patients to see on a monitor when they contract the correct muscles, strengthening the muscles, appropriately resting them, and increasing their endurance.⁹

Another type of biofeedback uses vaginal cones made of plastic or metal, with a string on the end as with a tampon. Initially, the lightest one is placed in the vagina. The patient

stands and contracts the PC muscles to prevent the cone from slipping out of the vagina. As the technique is mastered heavier cones are used to increase the strength of the muscular contraction.

Bladder retraining can be used to control frequency, urgency, and urge incontinence. The patient learns to contract the PC muscles whenever the urge to urinate arises. This inhibits bladder contraction through a sacral reflex and thereby lessens the urge to void. For example, a patient who voids every two hours tries to extend the voiding interval to 2 ½ hours, and then gradually to 3-4 hours.¹⁰

Intermittent Clean Self-Catheterization. Self-catheterization is a simple procedure used to manage overflow incontinence. It is an option when a permanent, in-dwelling Foley catheter is not desirable. The patient is taught how to insert a catheter through the urethra and into the bladder. Catheterization should be performed every three to four hours to keep bladder volumes less than 450 ml. Self-catheterization is unlikely to introduce infection, and a clean technique obviates the need for sterile gloves and catheters.¹¹

Medications

Patients who have moderate to severe incontinence may use medications to either fully eliminate or greatly reduce it. Urge incontinence can be treated successfully with anticholinergic medications (oxybutynin or tolterodine) that inhibit overactive bladder contractions.¹² Alpha-andrenergic receptor

blocking drugs like terazosin or tamsulosin can diminish lower urinary tract symptoms in men with an obstructing prostate. These drugs relax smooth muscle in the bladder neck and prostatic urethra, decreasing urethral resistance and facilitating bladder emptying.¹³ In women with post-menopausal atrophic vaginitis, local application of estrogen cream as little as once a week can lessen the incidence of urinary infection, frequency and urgency, and urinary incontinence.¹⁴

Summary

Over 17 million people in the United States suffer from urinary incontinence. UI limits functional and social activities and is a common cause of anxiety, social withdrawal, and depression. Primary care providers should take a proactive approach in searching for the presence of, and then investigating the reasons for, incontinence. Usually the diagnosis is apparent from the data obtained from a good history, physical examination, measurement of post-voiding residual urine,

"Over 17 million people in the United States suffer from urinary incontinence. [It] limits functional and social activities and is a common cause of anxiety, social withdrawal, and depression."

and urinalysis. A voiding diary can quantify the magnitude of the problem and response to treatment. Conservative treatment options include behavioral techniques such as timed or prompted voiding, changes in diet, pelvic floor exercises, and medications. If these measures fail, referral to a urological surgeon is appropriate so that further diagnostic studies can be offered as well as minimally invasive procedures or surgery.

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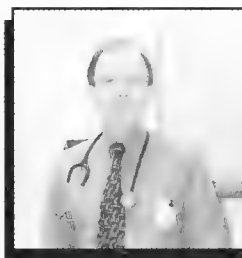
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A person trained in the healing arts

Michael E. McLeod, MD

After forty years in medicine I have decided to stop my clinical practice at Duke. Over the preceding few months I spent time thinking about this transition; I found myself revisiting the questions I asked as a young adult, questions like, "What is the meaning of life?" and "What is my purpose in it?" Part of the answer to my original questioning was my choice to go into medicine. But these are questions that we need to ask ourselves again and again as our perspective changes through life. In my case, I lost sight of the questions as school, house-staff training, marriage, children, and the demands of practice increased. My left brain—rational, objective, and goal-oriented—worked overtime, and too often my values focused on what was countable in numbers: patients seen, procedures done, money earned for the department and myself. I thought those numbers validated my worth, because I had learned from my training in science and medicine to trust objective data.

My right brain, with its emphasis on intuition, feelings, and emotions, was under-valued, and seem to provide only "soft data." Fortunately, time—with the help of my patients, children and wife, and a successful bout with cancer—worked a change on my value system. I began to appreciate the importance of relationships, of connections with people. I became a better human being—and a better doctor—as my right brain began to contribute more to how I saw the world. True, I had to give up some illusions about having all the answers, about being right all the time. I had to dismantle some of the protective walls I had built around my inner sense of vulnerability. Those walls were built during childhood and school and house staff training. Over those years I had learned to be self-reliant, objective, always

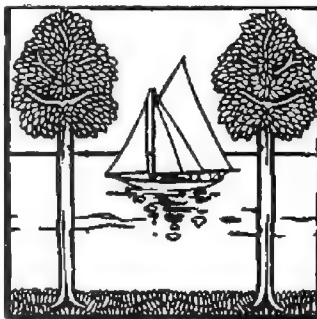
competent and professional; I had learned never to share doubt or fears or grief or anger.

Even as I began to re-ask the questions I had put aside many years ago, my ego still pushed me to compete. With all those desires to be right, to acquire money, power and prestige, the thought of leaving my place as a physician was frightening. Who would I be if I gave up that role? I saw my choices as continuing to do what I had been doing, to numb myself against the increasing desires to be sailing, playing

with grandchildren, hiking, or camping, or to explore parts of myself I had never allowed to be expressed. I chose to face my fears by facing some other unknowns, by doing an Outward Bound trip, a twelve-day vision quest (three days alone, fasting), and by making more quiet time to write poetry (I seem to express the feeling and emotional parts of who I am when I write).

Now, with the day of retirement actually here, my ego still struggles against the move, still wants to measure what I have done or failed to do. Where are the titles, the buildings with my name, the prizes of competition? I have had to say that I have none of those prizes. What I do have is the thousands of patient and teaching relationships that have changed me forever and, I hope, have changed others. I realize that what I have done is what I originally set out to do—to see patients and to teach. I am at peace (most of the time) with my forty years in medicine.

These last few months have also been a time to look at what would I do differently, or would have done earlier in my career, could I live it again. First, I would take longer vacations. One week is not enough time to separate oneself from roles at work and the feeling of indispensability. Two or three weeks, I have found, increases my energy and curiosity to explore things outside medicine. After two or three weeks my wife would say, "you seem more like the man I married." It took me years to hear what she was saying.



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Second, I would recognize earlier that medicine is a seductive profession. It can take all of your life's energy, leaving nothing for friends, family, or mate. Learning to set limits and say *No* seems to fly in the face of all I was taught. But beyond the arrogance of "I can do it all!" is the exhaustion and (too often) the resentment that came at the end of too long a day.

Third, I would have kept a journal, taking 15-20 minutes to reflect on each day in terms of feelings, emotions, surprises, gratifications, and future dreams. I might have seen earlier the value of one of my realized dreams: a six-month sabbatical in San Francisco, which included a cross-country trip in a camper with my wife and four children. Naomi Remen uses journaling with doctors across the country who come to her workshops because they have become cynical and burned-out. It helps raise their awareness of the inner life, and of the many special things happening all around them that they cannot see.

Fourth, I would practice being grateful for all I have, and for the faith that I will receive what I need in the future. I would live more in the present moment.

Medicine has been the most exciting, awe-inspiring journey I could have imagined. I still love it, and I will continue to teach. But there are grandchildren to play with, more to learn about sailing, and parts of me I have never met.

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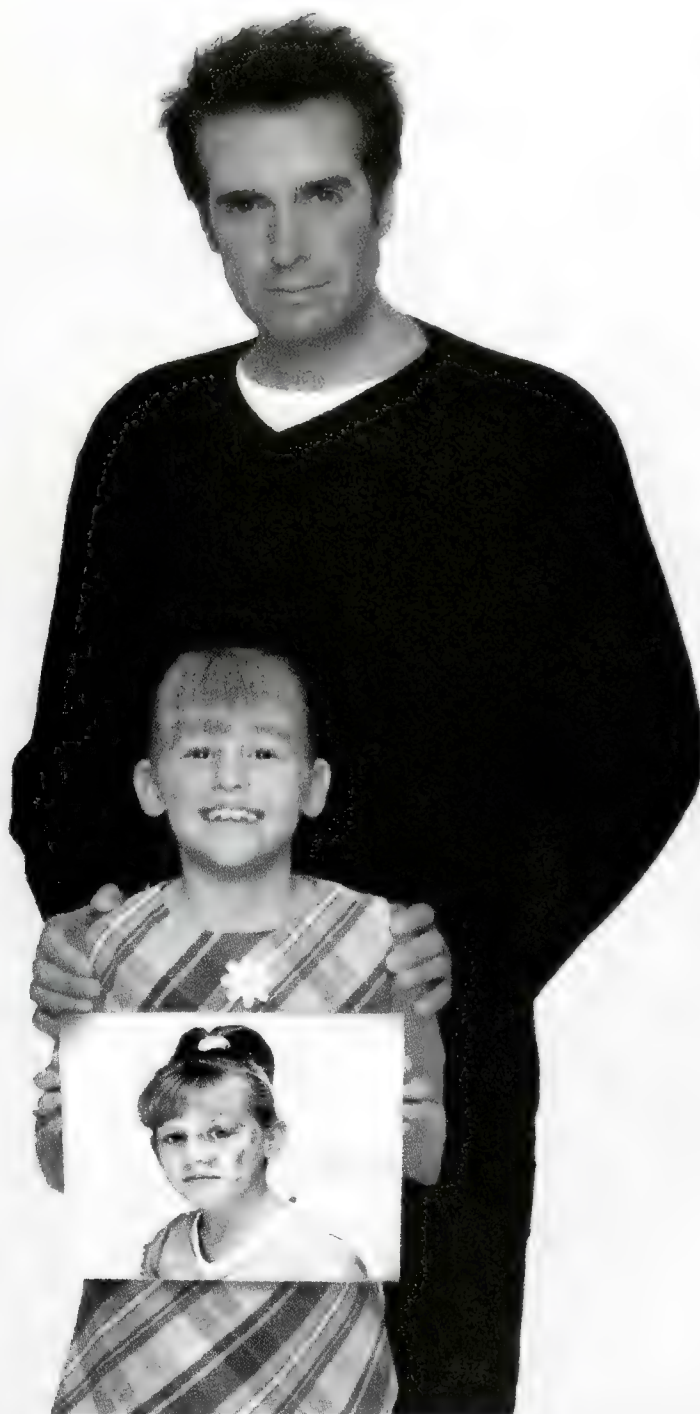
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A Rare Congenital Condition Discovered (Happily) Late In Life

Tetralogy of Fallot with Absent Pulmonary Valve

Scott M. Hovis, BS, John D. Rose, MD, Vincent L. Sorrell, MD

Every once in a while, clinicians come across a patient whose condition leads us to relearn what we thought we already knew. The case focuses attention on the condition itself as well as what we should do to help the patient. These instances remind us why William Osler said there should be no teaching without a patient for a text. We report here one such instructive case.

Our Patient

A 51 year-old woman, "known" to have tetralogy of Fallot, had been told at a young age not to have surgery. In 1980, cardiac catheterization had documented an elevated right ventricular (RV) pressure of 135/18, a pulmonary artery (PA) pressure of 23/13, and a left ventricular (LV) pressure of 130/10.

Oximetry confirmed a left-to-right ventricle shunt, with a pulmonary to systemic flow ratio of 2.2:1. A left ventriculogram demonstrated overall normal LV function with a ventricular septal defect (VSD) in the membranous septum. A right ventriculogram showed RV outflow tract (RVOT)

narrowing and marked dilatation of the left pulmonary artery. Tetralogy of Fallot (VSD with pulmonary artery stenosis, overriding aorta and RV hypertrophy) was diagnosed. She declined operative repair, in part because of her childhood counseling to avoid surgery.

She had done well until, but over the past three years she noted exertional dyspnea and expiratory wheezing, diagnosed as "asthma." She was treated with furosemide and bronchodilators, but the symptoms progressed. She developed dyspnea at rest, orthopnea, paroxysmal nocturnal dyspnea, increasing ankle edema, and documented paroxysms of supra-ventricular tachycardia. On examination her heart rate was 130 beats per minute, and her blood pressure was 127/65. The jugular veins were distended to the angle of the jaw in the sitting position, and there was a predominant V

wave. A parasternal lift was palpable; auscultation revealed a single second heart sound, a grade 3/6 harsh systolic murmur, and a grade 3/6 early diastolic murmur, both heard best at the left sternal edge. The lower extremities were cool and had pitting edema.

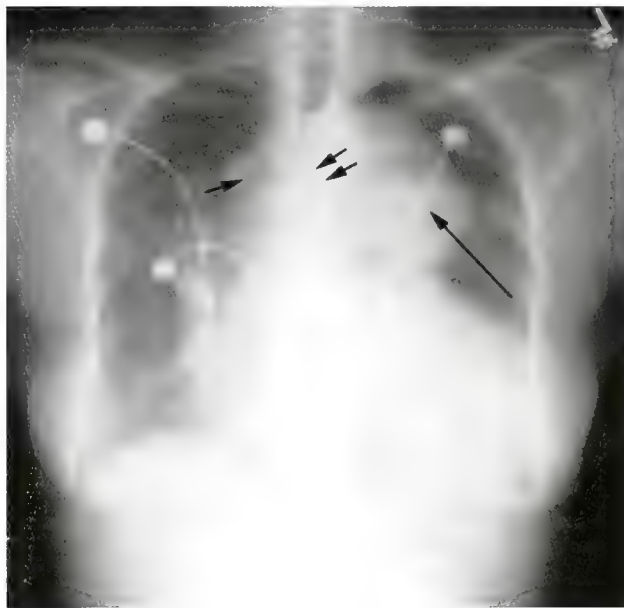


Figure 1. Chest radiograph showing a massively dilated left pulmonary artery (long arrow). Narrowing of the trachea is evident just above the carina (paired arrows). The aortic knob can be seen arising to the right of the trachea (short arrow).

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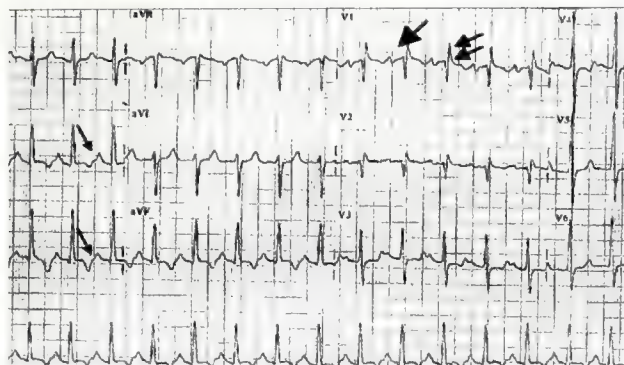


Figure 2. Electrocardiogram showing peaked P-waves in the inferior and lateral leads (narrow arrows) and a bi-phasic P-wave in lead V1 (wide arrow) indicating right atrial abnormality. There is prominent R-wave in V1 (paired arrows) consistent with right ventricular hypertrophy. There is also an incomplete right bundle branch block.

A chest radiograph demonstrated cardiomegaly, a grossly enlarged left pulmonary artery, a right aortic arch, and narrowing of the distal trachea (Figure 1). An electrocardiogram showed sinus tachycardia with signs of right atrial abnormality and right ventricular hypertrophy (Figure 2). Two-dimensional and Doppler echocardiograms disclosed normal LV systolic function. As shown in Figure 3, the RV was enlarged, and the left pulmonary artery was massively dilated. Color Doppler echocardiogram showed a predominantly left to right shunt across the VSD, and continuous wave Doppler echocardiogram demonstrated a peak flow of 1.5 m/sec, indicating a non-restrictive defect. There was turbulent flow across the RVOT with a peak flow velocity of 5.4 m/sec, and a pulmonary gradient of >100 mm Hg. There was regurgitation at both the pulmonic and tricuspid valves (Figure 4); peak tricuspid regurgitant flow velocity was 5.6 m/sec. A two-dimensional echocardiogram showed no identifiable pulmonic valve tissue in the area of the right centricular outflow tract. A color flow Doppler echocardiogram revealed a wide jet of pulmonic regurgitant flow essentially filling the right ventricular outflow tract.

A limited cardiac catheterization showed normal coronary arteries, but the left anterior descending artery was displaced by RV enlargement. A catheter was passed through the aortic valve, across the VSD, into the RV. RV pressure was elevated to systemic levels (108/12). A right ventriculogram showed a dilated, hypo-kinetic chamber. The diagnosis was modified to tetralogy of Fallot with absent pulmonary valve syndrome; it was confirmed at surgery.

The VSD was closed with a patch, and the RVOT was reconstructed with placement of a 29-mm homograft valve in the pulmonic valve (PV) position. The patient had dramatic improvement postoperatively, with immediate reso-

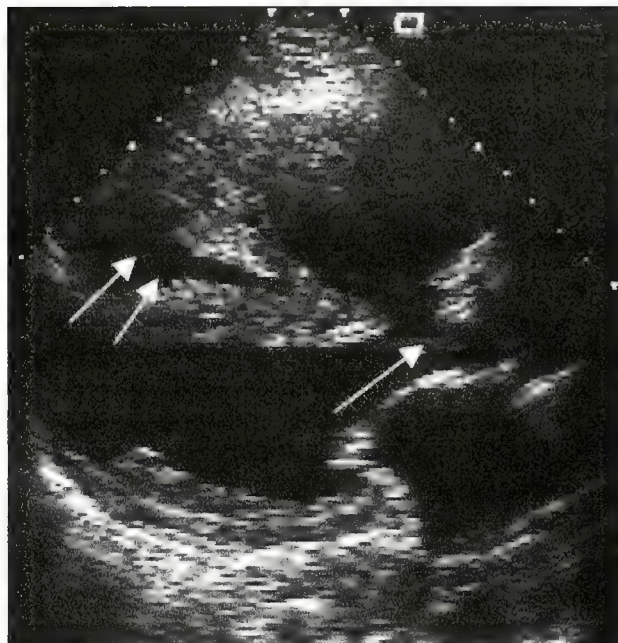


Figure 3: Two-dimensional echocardiogram (parasternal long axis view) demonstrating a large ventricular septal defect and over-riding aorta (single arrow), and a dilated RV with a thickened RV wall (paired arrows).

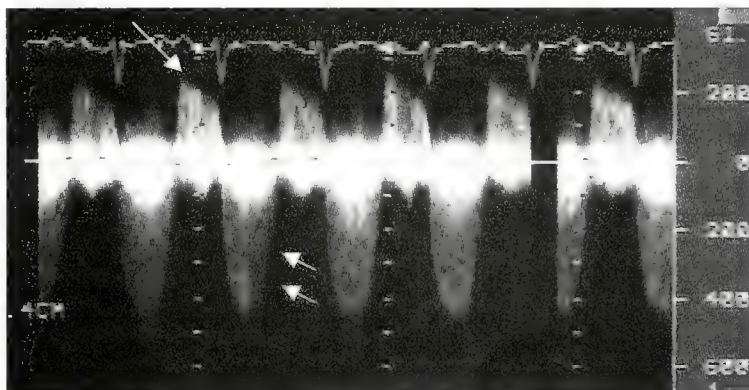


Figure 4: Continuous wave Doppler echocardiogram demonstrating peak flow of 5.4 m/sec (paired arrows) across the right ventricular outflow tract. A dense Doppler envelope is seen in both systole (paired arrows) and diastole (single arrow) consistent with severe outflow obstruction and pulmonic regurgitation.

lution of symptoms and signs of RV failure, and a reduction of heart rate from 120-130 to 70-80 beats per minute by post-operative day 2.

Discussion

Tetralogy of Fallot with absent pulmonary valve was first described by Cheevers in 1847.¹ It is an uncommon condition, comprising 2-6% of all cases of tetralogy of Fallot.² The condition differs from classic tetralogy in two crucial aspects:

(1) pulmonary regurgitation imposes a volume overload in addition to the pressure overload on the RV, leading to RV dysfunction and RV failure³; (2) there is massive dilatation of the pulmonary arteries, apparently because the ductus arteriosus is absent during fetal life.⁴ There is marked systolic expansion and diastolic collapse of the pulmonary arteries due to the elastic properties of the arteries and the pulmonary regurgitation. The enlarged arteries can compress central and peripheral pulmonary bronchi, resulting in bronchial obstruction.^{5-6,2} Vascularity of the peripheral lung fields is either normal or reduced.⁷

Dyspnea and exercise intolerance are found in classic tetralogy of Fallot. Children with tetralogy of Fallot often have hypoxic "spells" that consist of tachypnea and hyperpnea followed by severe cyanosis and, at times, serious hypoxic complications. In adolescents and adults, these spells disappear, to be replaced by dyspnea and exercise intolerance.⁸ The severity of symptoms depends chiefly on the degree of pulmonary stenosis.⁹

Our patient had the typical findings of tetralogy of Fallot with absent pulmonary valve syndrome although these became apparent relatively late in life. She had symptoms of bronchial obstruction (the apparent "asthma" recently diagnosed), and eventually developed RV failure, which led her to agree to surgical intervention. Her physical findings were typical, including a to-and-fro "sawing" murmur of pulmonary outflow obstruction and pulmonary regurgitation.¹⁰ The echocardiogram was diagnostic and, like the chest radiograph, demonstrated the characteristically huge left pulmonary artery.

We believe that our patient is the oldest reported person to have successfully undergone operative repair of tetralogy of Fallot with absent pulmonary valve. A patient operated on in Japan had concurrent aortic valve disease that required a modified operation.¹¹ It is likely that our patient survived to relatively advanced age because of three factors: 1) Despite high pressure in the RV, she maintained a left-to-right shunt and therefore was not cyanotic. 2) Bronchial obstruction was not severe, a finding in line with observations that this problem tends to be more prominent earlier in life. 3) RV failure did not develop until the sixth decade of her life.

Even though our patient had a tremendously enlarged left pulmonary artery, there seems to be no direct correlation between the size of the pulmonary artery and the degree of respiratory symptoms. The only correlation that has been identified is between early respiratory distress and the ratio of the area of the PV to that of the aortic valve (AV). Patients with a higher PV/AV ratio tend to have more severe respiratory distress, a finding independent of pulmonary artery size or degree of airway compression.¹²

It is important for doctors to be aware that patients with tetralogy of Fallot and absent pulmonary valve syndrome can survive until advanced age because full surgical repair is possible. The first successful surgical correction of tetralogy

of Fallot took place only in 1954,¹³ so it is likely that patients born around that time would not have been advised to have surgery at all, or would have been told to avoid its risks. This means that we may still recognize tetralogy of Fallot—even tetralogy of Fallot with absent pulmonary valve syndrome—for the first time in adult patients. Doctors need to maintain a reasonable index of suspicion for the syndrome in adults who present with the characteristic symptoms, radiographic and echocardiographic findings in later life. It has been suggested that finding a pansystolic murmur at the left sternal border, a single, unaccentuated second heart sound, and a low-pitched crescendo-decrescendo murmur in the area of the pulmonary valve starting roughly 0.1 second after the second heart sound is pathognomonic of VSD with absent PV.^{14-15,7} Our patient manifested these signs when she presented with onset of symptoms at age 51.

Conclusions

Tetralogy of Fallot with absent pulmonary valve syndrome is an uncommon condition whose characteristic clinical presentation differs from classic tetralogy of Fallot. Recognizing the typical symptoms and findings on physical exam and imaging studies requires a reasonable index of suspicion, but will lead to proper diagnosis and management of this syndrome in the adult patient. When patients already diagnosed as having the tetralogy of Fallot develop increasing respiratory symptoms, it is important to consider the syndrome and not to misdiagnose these symptoms as primary lung disease. These points are brought out in our patient who survived into her sixth decade of life, indicating that this condition can be seen undiagnosed in the adult population. We have also demonstrated that successful surgical correction is feasible for this condition, even in adults with severe RV failure.

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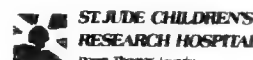
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Hospice

Care When There Is No Cure

Janet K. Horton, MS IV

As the American population ages, it is no surprise that the public demonstrates growing concern about end-of-life care. According to the Department of Health and Human Services, the 34 million seniors of today will become 68 million by 2030, and the prevalence of chronic disease will swell by 100%.¹ Unfortunately, advances in medical technology have created an increasingly intrusive environment for those in their last months and years. For too many, dying has come to mean hospital care, invasive machines, lack of personal choice, isolation from family, and loss of dignity. Recently, a wave of attention to end-of-life care has revealed Americans' dissatisfaction with this harsh reality. Fortunately, a small grassroots crusade that began in England offers alternatives to the modern medical death. It is called the hospice movement.

Cicely Saunders and the Beginnings of Hospice

The modern-day hospice movement can be said to have begun in 1967, when Dame Cicely Saunders opened St. Christopher's Hospice. However, the evolution of Dr. Saunders' philosophy and the social climate supporting palliative care was under way well before 1967.² Dr. Saunders began her professional career as a ward nurse during World War II. Back problems prompted her to pursue a war degree at Oxford, and in 1944 she began to practice medical social work. Still not satisfied with her education, Dr. Saunders obtained a medical degree from St. Thomas' Hospital in 1957.³ In each of these positions, Dr. Saunders had only limited resources available to treat patients in pain, or with which to respond to the requests of dying patients. One particularly poignant moment occurred in 1948 when Dr. Saunders encountered David Tasma, a Jewish émigré from

Poland. Mr. Tasma had terminal cancer, and bequeathed £500 to establish a facility to care for patients like himself. His generosity inspired in Dr. Saunders the vision of a place where she could treat those nearing the end of life, help them more effectively with their pain, and minister to the whole dying person rather than strictly the illness.⁴

That same year, while volunteering as a nurse at St. Luke's Hospital, Dr. Saunders became acquainted with the Brompton cocktail—a mixture of morphine, cocaine, chloroform, alcohol, and syrup or honey—which was the most advanced treatment for pain available. However, while pain was lessened, the patients were incapacitated so that they spent their last days in a stupor.⁵ Later, while Dr. Saunders was attending medical school, the medical community began to enjoy important advances in pharmacotherapy. Phenothiazines, antidepressants, benzodiazepines, synthetic steroids, and non-steroidal anti-inflammatory medications all had potential roles in palliative care.³ Dr. Saunders now had the resources to investigate better pain control and an improved Brompton cocktail. It soon became clear to her that pain relief allowed patients to deal with the other pressing matters of death like loneliness, spiritual pain, and fear.⁵

Dr. Saunders' combined research and experience, and her meticulous notes on patients, began to shape her vision. Her 1958 paper, "Dying of Cancer," addresses many of the issues—diagnostic honesty, spiritual care, and pain management—that would become tenets of the hospice movement.⁶ The medical community, however, was largely unprepared for this new philosophy. In response to her paper, one general practitioner wrote, "I was surprised to see you almost supporting the attitude that patients should always be told of their condition, as personally I have found the very reverse to be most effective."⁷ Despite the positive response of the public to her paper, it would take many years of hard work to gain the recognition of senior medical officials.²

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In 1959, Dr. Saunders wrote to influential medical and church personnel, attaching a copy of a document she called "The Scheme." In it, she outlined the kind of facility she envisioned, including details of bed capacity, staffing, and cost projections.⁷ Dr. Saunders' early supporters slowly grew into a diverse, resourceful group uniquely able to contribute to The Scheme, which by year's end had become "St. Christopher's Hospice." The project was officially under way.²

Dr. Saunders continued to solicit public support by giving lectures and spearheading fundraising projects. Her itinerary included an extensive stay in the United States. The 30 papers she wrote between 1958 and 1967 introduced potential supporters to the project. Dr. Saunders' energetic intensity, her training at St. Thomas' and her privileged middle class status enabled her to win the sympathies of a wide range of people. In 1965, she was awarded the Order of the British Empire in recognition of her important work. At last, she was beginning to attract the social interest and acclaim necessary to realize her vision.²

The Philosophy of Hospice Care

Dr. Saunders' philosophy of hospice care was molded during the years preceding the opening of St. Christopher's. She was an evangelical Christian, and had high hopes that hospice would function as an explicitly religious institution. She dreamed of an institution removed from the world and run by devoted, mission-oriented personnel. Although committed to this idea, she had to rethink her position when a large, potential donor organization was unwilling to fund a unidenominational venture.² Author David Clark speculates that this was a pivotal point in hospice history: "It is likely that this proved of enormous importance to the subsequent dissemination of hospice principles. Cicely Saunders and her colleagues opted for a strategy of practical action within the world, rather than an ethic of caring located outside it."² Choosing this route allowed Dr. Saunders to maintain the underlying importance of spiritual matters, but at the same time to achieve the visibility necessary to reach the professional world. "Three factors were now in place: an accommodation had been reached between faith and reason; professional interest in the care of the dying was beginning to grow; and influential social networks could be harnessed to the cause."² In Dr. Saunders own words, the hospice was to be

"something between a hospital and a home—combining the skills of the one with the warmth and the welcome that belong to the other."³ The earliest accommodations included ward space for 54 patients, with 16 beds explicitly for care of the elderly; an outpatient clinic; and a window memorial to David Tasma.³ In 1967, St. Christopher's received its first patients and became the springboard of the hospice movement.

Hospice Comes to New Haven and America

Even as St. Christopher's established itself in England, Dr.

Saunders was playing an important role in sparking the American hospice movement. Her 1963 visit to the US produced collegial contact with physicians, psychiatrists, public health specialists, nurses, social workers, sociologists, psychologists and chaplains from New York to California. It also brought Dr. Saunders into contact with Elisabeth Kubler-Ross, an American physician whose 1969 book, *On Death and Dying*, helped to foster and shape US interest in palliative care. These formative years proved valuable not only in their impact on Dr. Saunders' philosophy regarding St. Christopher's, but in the way that she influenced the growing hospice community.² As she said, "It soon became clear that each death was as individual as the life that preceded it and that the whole experience of that life was reflected in a patient's dying. This led to the concept of 'total pain,' which was presented as a complex of



Dame Cicely Saunders, founder of the Hospice movement, in 1988. By permission of the John C. Liebeskind History of Pain Collection, History & Special Collections, Louise M. Darling Biomedical Library, UCLA.

physical, emotional, social, and spiritual elements."³

Connecticut Hospice of New Haven opened its doors in 1974. This original American hospice, like so many that followed it, was funded primarily by grants and private donations. Much of the staffing was provided by volunteers, and the structural organization of these pioneer hospices was heterogeneous.⁸ Each location planned to serve the perceived needs of its population. For instance, the Connecticut Hospice initially provided only home care, but had plans to open a facility for in-patient care, which until that time had been handled by hospital physicians in conjunction with hospice. Another early hospice, St. Luke's in New York City, opened with home care, out-patient services, and a number of in-patient beds.⁹ This adaptability, while key to hospice survival, slowed national recognition because the movement was so loosely organized that the public was largely unaware of its existence.

The Government Steps In

There was little government recognition of the movement until the Tax Equity and Fiscal Responsibility Act of 1982, which added a hospice benefit to part A of Medicare. Cooperation between Medicare and hospice benefited both. Medicare's supplement sparked explosive hospice growth,¹⁰ and "[i]n some respects, hospice [became] Medicare's most successful managed care option. One fundamental characteristic of the program was its focus on cost-effectiveness."¹⁰ Medicare beneficiaries had a clear choice: they could continue or begin any curative treatment deemed appropriate for their condition, or they could choose treatment only for palliation of their terminal illness. Medicare initially planned to fund hospice for three years provided several payment restrictions were met. There was a cap of maximum payment, comparable to what Medicare would have spent on standard therapy. Medicare required hospice to ensure service superior to that which patients were currently receiving. For instance, hospice had to provide free bereavement counseling to the families of patients; volunteer participation level was not to fall below 5%; and, finally, Medicare placed stringent restrictions on discharge from care. There were very few instances in which hospice was allowed to stop providing care, regardless of whether they would be paid. These requirements were the first hints of mandatory structure and public funding for the hospice movement. The result was a large boom in growth and accessibility.¹⁰

Financing was not the only benefit hospice received from Medicare; there was also help in limiting competition. For example, hospice established that the same palliative care could not be delivered by a home health agency and, therefore, should not be reimbursed as a hospice benefit. Hospice argued that only specially trained professionals, working as a multidisciplinary team, should be qualified to provide hospice services.¹⁰ Hospice thus managed to carve out a unique niche within the Medicare payment structure. Interest in palliative care was further stimulated in 1989 when federal law authorized a 20% increase in Medicare reimbursement.¹¹

In 1988, the Academy of Hospice Physicians was organized. This group, now known as the American Academy of Hospice and Palliative Medicine, promotes research, physician training, and medical instruction in palliative care.¹² Still, hospice philosophy remains much the same today as it was 30 years ago. The modern hospice emphasizes "total pain" care by treating the physical, emotional, spiritual, and psychological components of pain. Treatment focuses on symptom management by a multidisciplinary team consisting of a nurse trained in palliative care, an attending physician, a hospice physician, social workers, spiritual counselors,

and volunteers. Other skilled caregivers (physical therapists, occupation and speech practitioners, music/art therapists, massage therapists, hypnotherapists, dietitians, and psychologists) are available if needed. The hospice mission is not to cure, but to maintain or improve quality of life.¹³ The National Hospice Organization puts it this way: "(1) Death is a natural part of the life cycle; when death is inevitable, hospice will neither seek to hasten nor to postpone it. (2) Pain relief and symptom control are clinical goals. (3) Psychologic and spiritual pain are as significant as physical pain, and addressing all three requires the skills and approach of an interdisciplinary team. (4) Patients, their families, and loved ones are the care of the unit. (5) Bereavement care is critical to supporting surviving family members and friends. (6) Care is provided regardless of ability to pay."¹⁴

Hospice Today

"The modern hospice emphasizes 'total pain' care by treating the physical, emotional, spiritual, and psychological components of pain."

Hospice philosophy has remained almost constant, but the very definition of palliation has changed with time and experience. At one time, treatment was categorized as either active or palliative. Then, palliation was subdivided into active or terminal, but the lines of distinction became blurred and the treatment objectives less clear. Now, the model of care is based largely on time from diagnosis. Curative care usually occupies the first part of treatment, while active palliation and pure palliation (hospice care) become priorities as time passes and the disease progresses. In

addition, the end point of palliative care is now bereavement rather than death, illustrating the importance of family as well as patient care.¹³

Hospice began with a promise of cost savings. Although it has not lived up to original expectations, Dr. Ezekiel Emanuel of the Dana-Farber Cancer Institute found that hospice care reduced costs by 10% or less during the final year of life, by 10-17% during the last 6 months, and by 25-40% in the final month. He postulated that the savings simply represented a transfer of costs from hospital to family because hospice relies heavily on family involvement in care. He did point out that hospice helps counteract the American tendency to use technology to stave off death, and thus to raise the cost of terminal care.¹⁵

Despite its successes, hospice has faced many problems, and more can be expected. As death and dying have become a focal point of the popular sector, assisted suicide has come to the forefront. Hospice, in fact, offers an alternative to suicide, but there is abundant confusion about the distinction between comfort and euthanasia.⁵ In addition, hospice must constantly struggle with the difficulty of predicting the end of life. Patients must have a life expectancy of less than six

months to be accepted for hospice care. The rate of progression of cancer is somewhat predictable, and there are guidelines to help with prognosis. However, the course of diseases like chronic obstructive pulmonary disease, congestive heart failure, and Alzheimer's dementia is much more difficult to predict, even using Criteria for Non-Cancer Diagnosis. Therefore, most hospice patients are cancer patients, and those with other illnesses remain underserved.¹⁶

The preparation and training of medical students and doctors is another hurdle the hospice movement has had to surmount. Not enough nurses or doctors trained in palliative care are available to fill the vacancies of coming years, much less to meet the needs of a growing hospice population.⁵ This problem is being addressed by organizations like the National Cancer Institute and the American Medical Association (which offers workshop education to practicing doctors who then return home to share their new knowledge). The Last Acts Coalition of the Robert Wood Johnson Foundation is supporting three medical education initiatives aimed at the incorporation of palliative care into medical textbooks, licensing exams, and residency training. Finally, the National Board of Medical Examiners is working on ways to add end-of-life care questions to the United States Medical Licensing Examination.¹⁷

Most of the opposition to hospice comes from the medical profession itself. Several aspects of contemporary medical ideology run counter to the practice of hospice care. These include the following: (1) An unwillingness to share patient care with others; in today's health care system, many doctors already feel that their autonomy has been marginalized; Relinquishing care to hospice may seem like another sacrifice. (2) A fear that hospice will erode doctors' income. (3) Over-optimism about the prognosis of terminally ill patients. And (4) the urge to cure even what is incurable.¹⁶ The problem was illustrated perfectly by an internist participating in a hospice focus group: "As humans we are taught to try to fight for every last ounce of life, and as doctors we are trained to help people accomplish that. I think for a lot of doctors still, [hospice] goes against the grain."¹⁶ An astounding number of doctors are simply unable or unwilling to face a terminal prognosis or to discuss end-of-life options. A study done by the HealthEast Hospice Physician Advisory Committee revealed that between January 1991 and July 1992 only 449 out of a potential 1,559 cancer patients were referred to hospice.¹⁶ Bonham et al found that, while 71% of patients expressed an interest in hospice when informed, 25% of physicians do not address hospice care even when the occasion presents itself.¹⁸ The combination of limited acceptance by the medical community and a reluctance to be forthright with patients has led to a vast underutilization of hospice services.

Local Efforts and Goals

Much of the current philosophy on hospice care, and on the barriers to its progress, was encapsulated by Dr. Douglas White, the interim medical director of the Kate B. Reynolds Hospice Home in Winston-Salem, during an interview in 1999 (personal communication, winter 1999). The Winston-Salem home health program, established some 20 years ago, was one of the first of its kind in North Carolina. Hospice services in Winston-Salem stay saturated with about 90 full-service hospice patients. Every in-patient is assigned a social worker and a nurse, and the services of a chaplain, volunteer, and certified nurse assistant are available as needed. Much of the funding for the home health service is provided by Medicare, and Dr. White feels that the Medicare benefit has brought more structure to hospice without impeding flexibility.

The Kate B. Reynolds Hospice Home opened its 20 in-patient beds in 1998. Funding came primarily from private donors and loans. A hospice social worker based at Wake Forest University Baptist Medical Center keeps hospice linked to potential beneficiaries of hospice care. The population make-up of the Winston-Salem Hospice differs slightly from the typical hospice in that only 65% of patients have cancer and 35% have a non-cancer diagnosis. But the problems faced by the Winston-Salem hospice are similar to those of other facilities across the nation, the chief being lack of referrals by doctors. Dr. White believes that the general attitude towards hospice is overwhelmingly positive, once people become familiar with it; patients

and their families are very grateful for hospice care and pleased with hospice services.

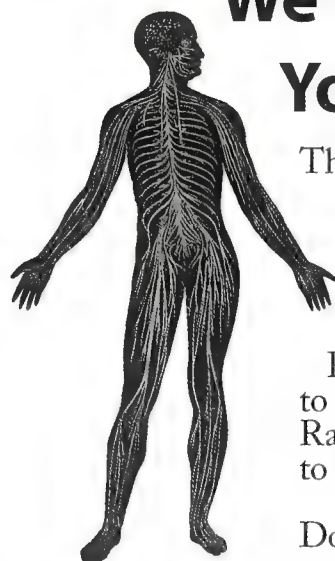
Hospice numbers have grown dramatically: from 516 in 1983 to 1,927 Medicare-certified hospices in 1996.¹⁰ According to a National Hospice Organization survey, 200,000 patients and their families received hospice care in 1990, and 340,000 in 1994.¹³ Hospice began because a few doctors and many lay people were dissatisfied with the kind of attention given to terminal care issues. Since its modest beginning, hospice has established a firm, though small, place in medical care. Author Gillian Ford points out that "the burdens of an aging population are already upon us. There are not merely more older people, but older people are living longer to incur cancer and other chronic disease; there are not merely more people to be hospitalized, but more who have no fit carers at home or even viable homes of their own."¹⁵ As our population ages, the hospice movement offers alternatives to the terminally ill population, and warrants the support of the American public and medical community alike.

"An astounding number of doctors are simply unable or unwilling to face a terminal prognosis or to discuss end-of-life options."

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The Charms of Music

Step By Step Prescription for Patients

Matthew Alexander, PhD

*Music hath charms to soothe the savage breast,
To soften rocks, or bend a knotted oak.*

—William Congreve, "The Mourning Bride"

Recently, there has been a burgeoning of popular and scientific interest in the therapeutic applications of music. In a literature search covering only the last 10 years, I found over 100 English language research papers linking the key words "music" and "healing" or "health." That the results of this research are filtering down to the general public is evidenced, in part, by the success of Don Campbell's 1997 book entitled *The Mozart Effect*. Despite the amount of research on music and healing, however, little has been written about it in the family medicine literature; one review of the past 20 years found only a single citation from a family medicine journal.¹ Most research has investigated the health effects of passive listening to music, but it is important to note that active music-making has a positive impact on health.² In fact, there is a long history of alliance between music and medicine. Apollo the Physician, to whom the earliest versions of the Hippocratic oath are addressed, was a proficient musician. The shamans who were the first health care providers routinely used music and dance in their healing therapy. The Greeks used music to soothe the mentally ill, and to help patients cope with painful emotions like sadness, anxiety and anger.

Because of the relative sparseness of information about the therapeutic value of music in the family medicine literature, I have prepared this article to (1) summarize the research relating to the clinical applications of music; (2) suggest a rationale for the use of music as an adjunct in medical care; (3) articulate a protocol by which family doctors can "prescribe" music to their patients; and (4) provide lists of specific musical selections and of books suitable for use in medical practice.

Clinical Applications of Music

Music and Relaxation: Music reduces anxiety, decreases blood pressure, and lowers heart rate.^{3,4} In the hospital setting, music can help people relax before and during anxiety-provoking procedures such as computed tomographic scans, colonoscopy, bronchoscopy, day surgery and cancer-related surgery.⁵⁻⁸ There is evidence that music can calm newborns,⁹ and can ameliorate childhood hyperactivity.¹⁰ Music's relaxing effect has been successfully used to treat insomnia.¹¹ Music can reduce the temporary emotional response to stress in patients hospitalized with myocardial infarction,¹² in hospice patients,¹³ in patients in intensive care units,¹⁴ and in patients undergoing mechanical ventilation.¹⁵

Music and Pain Management: A significant body of evidence suggests that music reduces the perception and experience of pain and increases tolerance of both chronic and acute pain.¹⁶ Music has been used successfully to treat pain in cancer patients,¹⁷ surgical patients,¹⁸ women in labor and postpartum,¹⁹ and dental patients.²⁰ One hypothesis suggests that music distracts patients from pain, breaks the cycle of anxiety and fear that intensifies pain reactions, and refocuses attention on pleasant sensations. There is support for the hypothesis that endorphin release produces the palliative effect of music.¹⁷

Music and Mood: Music has been found to improve depressed mood²¹ and increase energy level,²² in addition to decreasing situational and chronic anxiety.

Music and Intelligence: Music can facilitate concentration, problem solving, and cognitive function.²³ It may stimulate long-term memory recall in Alzheimer's patients.²⁴ In a recent conversation, the president of the largest karaoke

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(sing-along music) company in America told me that his company is planning to greatly expand its "presence" in nursing homes. Regular group karaoke sessions, he said, have helped previously nonverbal Alzheimers' patients sing the lyrics of songs from their youth, often to the amazement—and tears—of nursing home staff (personal communication from Derek Slep, President of Sound Source, April 21, 1999).

Music and Health: There are anecdotal reports that toning (the sustained singing of open vowels) helps reduce tumors²⁵ and improves immune function.²⁶

Rationale for Music in Medicine

The data demonstrating the clinical usefulness of music as an adjunctive tool are persuasive in themselves, but there are other reasons for using music in our current practice environment. One of these is patients' receptivity, a function of patients' increased interest in "alternative" methods of healing.²⁷ Alternative medicine is popular in part because it encourages patients to participate actively in their own healing.³³ Active participation tends to make patients more satisfied and compliant, and raises their levels of self-esteem. Alternative therapies—including music—seem less rigid and more "in tune" with patients' beliefs about wellness. The rise of such attitudes has affected medical education. In 1997, the American Medical Association called on medical schools to increase training in complementary or alternative practices, including the use of music.²⁹ Current health care finances also contribute to the popularity of alternative therapies. Adjunctive treatments like music are cost-effective and suitable for the new health care environment.

Prescribing Music as Treatment

The first step in prescribing music is to educate patients briefly about its relevance to their particular medical condition. It is helpful to cite scientific evidence supporting the adjunctive use of music. The doctor should then explore the patient's musical background and taste. A number of studies suggest that the therapeutic effects of music are enhanced when patients actually choose their own musical selections.³⁰ One possible explanation of the importance of personal choice is that it provides a measure of control; patients who perceive that they have control over their disease or treatment do better than those who feel powerless.³¹ Finally, physicians should encourage patients to listen "mindfully" (that is, with

full attention) to selections they already enjoy or to choose a new selection from a list supplied (see Appendix 1). I suggest that doctors wanting to prescribe music use the following protocol.

Education: The doctor might start with an opening like this: "Mrs. C, I am interested in helping you find comprehensive solutions to your medical problem(s). In addition to the approaches we have been taking, I would like to explore with you some other methods of treatment. There has been a lot of solid scientific research lately on how listening to (or playing) music benefits the particular problem you are having. Would you be open to exploring with me the possible use of music to help you with your problem?"

The doctor should proceed only if the patient expresses an openness to and interest in music as an adjunctive aid. Patients who are skeptical might be encouraged to read one of the books suggested in Appendix 2.



History: The doctor should spend a few minutes gaining a better understanding of the patient's relationship with music. This will help personalize the treatment. The following questions can help determine musical preferences:

"I'd like to ask you a few questions to help me better understand the present role of music in your life. Answers to these questions will help me make specific suggestions. Do you enjoy music? If

so, what types of music do you most enjoy listening to? Are there any types of music you do not enjoy? On a daily basis, about how much time do you presently spend listening to music? Where do you most enjoy listening to music: car? home? live performance? with headphones? What types of music listening equipment do you currently possess (boom box, home stereo system, car stereo system, etc)?"

"Since playing music is also very helpful in your particular condition, I would like to ask if you currently play or have ever played an instrument? If so, what instrument? Why did you stop (if appropriate)? Are you interested in starting to play again or learning to play another instrument? About how much time do you currently spend making music (if appropriate)?"

Treatment: Once history-taking is complete, patients should be asked whether they are willing to incorporate music into their lives as an adjunctive tool for well being. If so, patients should be given specific recommendations.

Those who want to use music to cope with painful medical procedures or childbirth should be encouraged to bring music of their choosing to the hospital or clinic. It is helpful if the chosen selections are ones that the patient has already listened to at home, and with which the patient has

positive associations. Unless the hospital provides a portable player, it is best for patients to bring their own to the hospital.

If music is being used to induce relaxation, patients should listen to musical selections at the same time each day. A regular schedule increases compliance and, with time, deepens the therapeutic effect. To achieve the deepest relaxation, the listeners should give full attention to the music, but there are benefits as well from listening to musical selections while carrying out other tasks like driving (better not get too relaxed), washing the dishes, or cleaning the house. Family members should be told ahead of time not to interrupt while the patient is listening to music ("doctor's orders"). Patients should sit comfortably, close their eyes, and breathe slowly while listening. They should be encouraged to pay attention to any internal visual images and physical sensations that arise while listening. The relaxing effects of music are deepened when patients combine listening with visualization.³¹ Using headphones may deepen the relaxing effects, but personal preferences should be respected. Classical and new-age music are particularly relaxing, but there are data indicating that "designer" music (planned to produce specific effects on the listener) is most useful in the treatment of anxiety and negative mood (see Appendix 1).³²

At times, patients, particularly depressed patients, can use music to energize themselves. As a general rule of thumb, music most effectively changes mood when the first of a sequence of selections corresponds to the patient's existing mood, to be followed by selections that more closely approximate the preferred mood state. Thus, depressed patients would undertake a musical excursion that begins with slow-moving, mournful music ("matching" the depression) and slowly progresses into more up-tempo, happy selections. On the other hand, anxious patients would move from high-energy, frenetic music to more even-tempered, "mellow" sounds. Patients can be encouraged to create a tape-collage of their own using these general guidelines. To increase the "legitimacy" of the intervention, doctors can write down musical suggestions on a prescription pad.

Follow-Up: Patients should bring a log of their musical experiences to subsequent appointments. The doctor can then ask the patient how the music sessions went and what benefits were observed. When appropriate, patients should be complimented on their successful incorporation of music into their lives, and their commitment to furthering their own health.

Wrap-Up

After reviewing the experimental findings, I believe that music can be an appropriate adjunctive tool for medical practice. I have presented a rationale for the clinical use of music, and suggested a protocol for doing so in medical

practice. (Specific musical selections and readings are supplied in the Appendices.) I encourage doctors to try this simple, inexpensive, and effective way to enhance their care of their patients.

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Appendix 1. Recommended musical selections

Classical Compilations

Tune Your Brain: Music to Manage Your Mind, Body and Mood. Elizabeth Miles, Polygram 1997.

Uses selections from Mozart, Handel, Schubert, Wagner, and other composers to help listeners with insomnia, panic, lack of concentration, grief reaction, pain management, moodiness and other conditions.

Music for the Mozart Effect. Don Campbell, Spring Hill Music, 1997.

Uses selections from Mozart to help listeners improve mental function (Volume 1), deepen relaxation (Volume 2), or improve creativity (Volume 3).

Bach for Relaxation. JS Bach, RCA Victor, 1998.

Chooses selections from Bach to facilitate relaxation.

Meditations for a Quiet Dawn. Nimbus Records, 1993.

Reflective selections from Tchaikovsky, Mendelson, Rachmaninof, etc.

Night Tracks. Warner Records, 1996.

Selections from Satie, Dvorak, Copland, St. Saens, Bach.

New Age Instrumental Music

Higher Ground. Stephen Halpern, Inner Peace Music, 1-800-909-0707.

A deeply soothing original collection by the "grandfather" of ambient music.

Novus Magnificat. Constance Demby, Hearts of Space Music, 1986.

A "classic" of New Age instrumental music.

All the Seasons of George Winston. George Winston, Windham Hill, 1998.

A compilation of original solo piano works.

Designer Music

Sound Healers Collection. Steven Halpern, Kay Gardner, Jorge Alfano and Randy Crafton, Relaxation Company, 1996.

Four musical suites specifically designed to promote relaxation and creativity and useful for a variety of conditions, including stress and back pain.

Appendix 2. A reading list on music and healing

1. Don Campbell. *The Mozart Effect.* Avon Books. 1997.
2. Hal Lingeran. *The Healing Energies of Music.* Quest Books. 1983.
3. Robert Jourdain. *Music, The Brain and Ecstasy.* Morrow Books. 1997.
4. Joanne Crandall. *Self-Transformation Through Music.* Quest. 1986.
5. Barry Green. *The Inner Game of Music.* Anchor Press. 1986.
6. Kay Gardner. *Sounding The Inner Landscape.* Element. 1990.
7. Carolyn Sloan. *Finding Your Voice: a Practical and Spiritual Approach to Singing and Toning.* Hyperion. 1999.
8. Joy Gardner-Gordon. *The Healing Voice: Traditional and Contemporary Toning, Chanting and Singing.* The Crossing Press. 1993.
9. Jonathan Goldman. *Healing Sounds: The Power of Harmonics.* Element. 1992, 1996.

Depression and Vascular Function in Older Adults

Evaluating the Benefits of Exercise in a New Study at Duke University

James A. Blumenthal, PhD, Alisha Hart, PhD, Andrew Sherwood, PhD, Murali Doraiswamy, MD, Steve Herman, PhD, Lana Watkins, PhD, Alan Hinderliter, MD, Elizabeth Gullette, PhD, K. Ranga Krishnan, MD

An aging population—with its increased prevalence of chronic diseases—is a major challenge facing society and the medical community. Depression is significant in this context because it can be both a cause and a consequence of disability. Depressive symptoms are correlated with the presence of one or more chronic diseases,^{1,2} the inability to work,³ and the number of days in bed or away from normal activities.² Depressive symptoms increase mortality risk⁴ and the use of medical services,⁵ and decrease well-being and functional status.⁶ Major depressive disorder (MDD) is the most prevalent of all psychiatric disorders,⁷ affecting up to 25% of women and 12% of men during their lifetimes.⁸

Treatment of depression has focused on reduction of symptoms and restoration of functioning.⁹ Antidepressant medication has been particularly effective in this regard, and has become the treatment of choice;¹⁰ but for a significant number of patients medication either does not adequately relieve symptoms or produces unpleasant side effects. There is thus a need to identify alternative ways to treat depression, and good reason to believe that exercise may be one of these. A number of studies have shown that exercise improves psychological functioning, including mood and cognitive performance.^{11,12} Exercise holds a number of potential advantages over traditional medical therapies for treating depression: it is relatively inexpensive, it improves physical as well as psychological functioning, and it avoids the side

effects associated with medication. To date, however, the therapeutic potential of exercise remains unrealized because there are few well-designed clinical studies of exercise in depressed patients.

Exercise may be especially important in treating depression in older adults in whom the adverse effects of antidepressant medications may be more common or more problematic.¹³ In addition, there is evidence of a link between vascular abnormalities and depression, particularly in older individuals.¹⁴ By improving both depression and vascular function, exercise may be a particularly effective intervention. In this article, we review the existing literature on exercise and depression, and on the link between depression and vascular functioning. We then call attention to a new randomized trial that will explore the relationship of exercise to depression, and vascular function in depressed older adults.

Exercise and Depression

We have recently reviewed the empirical evidence linking exercise and depression.¹⁵ In brief, evidence from correlational studies, experimental studies in healthy individuals, and experimental studies in clinical settings all suggest a significant inverse association between physical fitness and depressive symptoms. For example, a number of cross-

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sectional studies have found that physically active subjects have significantly lower self-reported depression scores than sedentary subjects do. In several longitudinal studies, higher levels of physical activity at baseline correlated with lower scores on depression measures at follow-up; conversely, subjects who were inactive at baseline were more likely to have an increase in depressive symptoms over the study period.¹⁶ These studies suggest a link between physical fitness and depression, but cannot prove a cause-and-effect relationship because of study designs (inactive persons may not exercise because they are depressed rather than be depressed because they are inactive).

In early experimental studies, aerobic exercise training sufficient to increase cardiovascular fitness lowered depression scores and increased self-concept in non-depressed, healthy individuals; those with the highest initial depression scores showed the greatest improvement. Methodological limitations of these studies included self-selection bias, absence of adequate controls, and imprecise assessment of exercise training effects. Furthermore, results in healthy individuals do not necessarily extend to clinically depressed individuals.

Several studies have looked at the effects of exercise training in clinically depressed subjects. Active exercise was more effective than being put on a waiting-list, and just as effective as psychotherapy, in reducing the severity of depression symptoms.¹⁷ In other studies, exercise therapy alone was as effective as exercise therapy combined with pharmacotherapy.¹⁸ These studies provide preliminary evidence for the benefit of exercise in depression, but that interpretation is limited by several serious methodological shortcomings: lack of randomization, failure to adequately assess and document exercise effects, confounding of exercise with psychotherapy, and inclusion of subjects classified as "depressed" solely on the basis of self-reported symptom severity rather than clinical interviews.

These shortcomings were addressed in a study recently completed at Duke University Medical Center. A randomized clinical trial called the "SMILE" (Standard Medical Intervention and Long-Term Exercise) study demonstrated that exercise reduced depression as effectively as medication in older adults.¹⁹ A total of 157 men and women aged 50 years and older, who met criteria for MDD, were randomized to treatment with exercise or medication (sertraline) or a combination of exercise and medication for four months. At entry, levels of depression as measured either by the Hamilton Rating Scale for Depression (HAM-D) or the Beck Depression Inventory (BDI) did not differ significantly among the treatment groups. All three groups exhibited a significant and meaningful decline in depressive symptoms after four

months, but most importantly, patients in all three treatment arms showed equal improvement. After four months there was no significant difference between groups in the proportion of patients who no longer met criteria for MDD (60% of the exercise group, 65% of the medication group, and 68% of the combined exercise and medication group). Interestingly, the *rate* of improvement did differ: Patients in the medication group improved more rapidly (in the first few weeks) than patients in the other two groups. It was impossible to determine whether the rapid response was due to treatment with medication or was a placebo response because there was no treatment control (placebo) group. That was a limitation of the study, as was the fact that exercise training was conducted in a group setting, leaving open the possibility that the observed benefits derived from concurrent social support, rather than from improved physical fitness.

A six-month follow-up of SMILE participants found that, among patients who went into remission during treatment, those originally in the exercise group showed significantly lower rates of relapse compared to the other groups.²⁰ Maintaining exercise during the post-experimental period was associated with a reduced probability of relapse into MDD (odds ratio = 0.49; $p < 0.001$). Only 8% of exercise participants relapsed, compared to 38% of participants in the medication group and 31% in the combination group.

"[T]he prevalence of depression appears to be particularly high among hypertensive persons and those with cardiovascular risk factors like diabetes and hyperlipidemia."

Vascular Function and Depression

We only poorly understand the causes of depression in older persons where genetic factors apparently play a small role. However, the prevalence of depression appears to be particularly high among hypertensive persons and those with cardiovascular risk factors like diabetes and hyperlipidemia. A growing body of evidence from clinical and imaging studies suggests that structural and ischemic brain changes may be of primary importance in many older patients with late-onset depression.¹⁴ For example, a number of magnetic resonance imaging (MRI) studies have found that older depressed patients have more extensive areas of hyperintense, subcortical white-matter lesions compared to matched, non-depressed controls. These data have led investigators to speculate that vascular disease may underlie depression in at least some older patients with MDD. The term "vascular depression" has been used to describe depression that occurs in patients with multiple infarctions or localized ischemia in a strategic brain region like the caudate nucleus.¹⁴ Using MRI criteria for diagnosis, vascular depression has been implicated in up to 50% of cases of late-life depression.

There are no long-term prospective studies to fully characterize the clinical correlates of vascular versus nonvascular depression. Emerging data suggest that vascular depression may be associated with cognitive impairment and disability. It is not well established whether acute treatment response or long-term prognosis differs between patients with vascular and nonvascular depression. Those with vascular depression typically respond to electro-convulsive therapy (ECT), but those with overt cardiovascular disease, stroke, or vascular dementia also respond well to drug therapy. Two recent retrospective analyses of large clinical trials found that elderly depressed patients with vascular disease actually had better response to medication than did those without vascular disease. However, there have been few prospective, placebo-controlled trials comparing treatment in vascular and nonvascular depression.

Endothelial Function, Exercise, and Depression

It is now possible to assess vascular function noninvasively using ultrasound imaging of the brachial artery. Abnormal endothelial function has been linked both to coronary heart disease and to traditional risk factors for cardiovascular disease (cigarette smoking; hypercholesterolemia; positive family history of heart disease), suggesting that endothelial dysfunction is an early marker of cardiovascular disease. Because compromised cerebral blood flow is associated with depression in some individuals, it is possible that potentially treatable vascular dysfunction leads to depression in older persons. Substances like estrogen that augment endothelial function reduce the risk of cardiovascular disease, and they might also improve depression and cognitive dysfunction.

Exercise training effects on endothelial function may account in part for its antidepressant effects. A study comparing athletes to non-athletes found that physical fitness was associated with increased nitric oxide (NO) production, apparently because of increased endothelial NO synthesis. In patients with heart failure, physical training dramatically improves NO-mediated endothelial vasodilation. Animal studies implicate repetitive episodes of acutely increased blood flow, which accompany bouts of physical training, in increasing endothelial NO synthesis and release. The long-term effects of exercise may be the result of healthy cerebral blood flow regulation and improved endothelial functioning, and this may, in turn, alleviate symptoms of depression.

Summary and New Directions

Early studies of the relationship between physical fitness and mental health suggest that exercise is a viable treatment for clinical depression, but there have been few methodologically sound investigations of its therapeutic potential. The benefits of exercise may be especially important in older adults, who are less likely than younger individuals to tolerate antidepressant medications and are more likely to have compromised vascular function.

In an earlier study of exercise training for depression in older adults, we compared supervised, group exercise to treatment with sertraline and to a combination of exercise and sertraline. Methodological shortcomings compromised our ability to draw conclusions about the mechanisms responsible for the beneficial effect of exercise. A new study, funded by the National Institutes of Health, is designed to

circumvent those shortcomings. This single-site, randomized clinical trial will compare the efficacy of home exercise, supervised exercise, and treatment with sertraline or a placebo. As a further extension of our earlier work, subjects will undergo assessment of vascular function, clinical characteristics, and treatment outcomes compared in those with and without vascular depression.

We will enroll 216 adults aged 50 years or older who meet criteria for major depressive disorder. Patients who currently are on medication, engaged in psychotherapy, or exercising regularly will be excluded. Participants will be assessed before treatment, at completion of the four-month treatment program, and at 6 and 12 months after treatment.

All subjects will undergo comprehensive assessment, including a physical screening exam, a clinical interview, an exercise treadmill test, and a baseline MRI scan of the brain to assess the presence of vascular disease. Vascular function will be characterized by ultrasound examination of the brachial and carotid arteries and a blood pressure assessment of baroreflex control. Participants will complete a psychometric test battery to test potential secondary psychosocial endpoints (anxiety, self-concept, and social support), and neuropsychological testing to evaluate memory, concentration, and executive functioning. Eligible patients will be randomly assigned to one of four treatment groups, each four months in duration. The treatment groups consist of the following:

(1) Supervised aerobic exercise. This aerobic exercise program consists of walking, biking, and jogging or a combination of these. Three times a week subjects will attend 45-minute supervised sessions at the Duke Center for Living.

"The benefits of exercise may be especially important in older adults, who are less likely than younger individuals to tolerate antidepressant medications and are more likely to have compromised vascular function."

(2) **Home-based aerobic exercise.** Subjects in this group will meet with an exercise physiologist twice during the four-month treatment program, but will be asked to walk, bike or jog on their own for 45 minutes three times each week.

(3) **Medication.** Subjects in this group will take the antidepressant medication, sertraline (Zoloft). They will be seen regularly by a study psychiatrist. Both the subjects and the psychiatrist will be blind to the nature of the medication the subject is taking.

(4) **Placebo.** Subjects in this group will take a pill that contains no active ingredients. They will be seen regularly by a study psychiatrist. Both the subjects and the psychiatrist will be blind to the nature of the medication the subject is taking.

Subjects will not be charged for the assessments or the treatments. They will be compensated for time and travel expenses. Those wishing further information should contact the Study Coordinator, Alisha Hart, PhD, at (919) 681-2612.

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Health and Social Problems of a Primary Care Clinic Population After a Disaster

The Hurricane Floyd Flood

Matthew D. Curry, MA, RN, Christopher J. Mansfield, PhD, Kathleen D. Leonardo, BSN, RN

On September 15th, 1999, Hurricane Floyd made landfall on the North Carolina coast. It added 21 inches of rain to the eastern region of a state already drenched by an earlier tropical storm. Together these storms led to the worst flood disaster in North Carolina's history, affecting 66 counties. Fifty-two lives were lost. More than 7,000 homes were destroyed, 17,000 left uninhabitable, and 55,000 damaged. During the height of the disaster, an estimated 50,000 people sought refuge in shelters.¹ In Pitt County, one of the hardest hit areas, the flood structurally damaged 4,200 homes and left 1,600 unusable.² Many businesses were shut down or destroyed because of the flooding, resulting in major economic setbacks for employees and employers. The disaster caused at least \$6 billion in damages,¹ \$280 million in Pitt County alone.² One year after the flood, eastern North Carolina is still struggling to recover.

Several reports have described medical and public health responses during and immediately after the disaster,³⁻⁵ but long-term health effects are still unknown.⁴ A survey of 18 emergency departments in eastern North Carolina found an increase in dog and spider bites, dermatitis, diarrhea, asthma, febrile illness, suicide attempts, and violence in the seven weeks following the disaster.³ Similar patterns of morbidity have followed other severe floods.⁶⁻⁸ Transient emotional problems are common, but they may also experience more somatic illnesses and begin to use health services more frequently.⁹⁻¹² Higher than expected rates of lymphoma, leukemia, and spontaneous abortion,¹³ and mortality have also been documented among survivors of flood disasters.¹² These studies point to a need for long-term health surveillance after flood disasters.

While it is reasonable to assume that health care providers can help prevent or alleviate many health and social problems of flood victims, there is scant documentation of the long-term needs of clinic patients after such disasters.¹¹ On the other hand, we do know a lot about pre-existing medical and social problems in eastern North Carolina. Before the flood, the poverty rate there was 40% higher than the national average. The ratio of primary care doctors per resident was half the national average,¹⁴ and the region ranked worst among the 50 states in terms of premature mortality (unpublished data from Mansfield et al¹⁵). We therefore surveyed patients coming to a primary care clinic in order to learn more about the well-being of the population in a county that experienced major flooding. This paper describes socioeconomic problems, barriers to medical care, and the perception of health problems that followed the Floyd flood.

Methods

We surveyed patients attending the Family Practice Center at the Brody School of Medicine at East Carolina University. The clinic serves a multi-county region in eastern North Carolina, but most of the patients live in Pitt County, one of the counties hardest hit by major flooding. The clinic cares for adults and, to a lesser extent, children. Many of the patients live in poverty, have multiple health problems, and have insufficient health insurance coverage.

The survey was conducted from January 10-16, 2000. Front desk personnel invited patients to participate in the

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Table 1. Demographic characteristics of 539 adult survey respondents

Age	
18-44	54%
45-64	28%
≥65	10%
NR*	7%
Gender	
Women	64%
Men	27%
NR	9%
Race	
African-American	58%
Caucasian	30%
Other	<2%
NR	11%

*NR=Not Recorded

For purposes of analysis, we classified respondents into three groups on the basis of their flood experiences: (1) Patients who reported damaged or lost property were classified as being directly affected by the flood. (2) Those who suffered only economic losses or who took others into their home were classified as indirectly affected. (3) Those who experienced no problems during the flood were classified as unaffected.

Results

During the week of the study, 1,056 patients came to the clinic, and 626 (59%) of them returned surveys. We report here on data provided by 539 adult patients. The demographic characteristics of this group (Table 1) reflect the demographics of the clinic population as a whole.

Three hundred and twenty-five of the 539 respondents (60%) reported being affected by the flood (222 directly and 103 indirectly). About 31% of respondents reported that

their homes were flooded; 14% lost their homes and 17% sustained damage to their homes (Table 2). One in four reported damage to or loss of home furnishings, and more than one quarter (28%) lost personal belongings. One respondent in five (21%) reported flooding of an automobile, and more than half of these patients lost their cars. Six percent of patients lost ev-

Table 2. Proportion of 539 respondents reporting property loss or damage

	Lost		Damaged		Total	
Home	14%	74	17%	94	31%	168
Home furnishings & appliances	18%	98	7%	37	25%	135
Automobile	13%	64	8%	41	21%	110
Personal belongings	20%	106	8%	45	28%	151
Lost everything except car	6%	30				
Lost everything including car	6%	33				

study and distributed the survey instrument. Patients completed the form in the lobby while waiting to be seen by their health-care provider. Nurses helped patients as needed, responded to questions and concerns, and collected the survey forms after placing patients in examination rooms. Clinical leaders and the hospital's Institutional Review Board approved the study.

The survey included a statement of purpose, demographic questions, and multiple-choice questions pertaining to patients' flood experiences. The multiple choice questions asked about damage to and loss of property (home, home furnishings, personal belongings, automobile, or other property); economic losses (two or more weeks of lost work or loss of employment); taking persons displaced by the flood into their home; barriers to medical care (finding time for clinic visits; paying for care; loss of medicines or medical devices); and any perceived changes in health status of any family members due to the flood (new or worsening health problems). A Spanish version of the survey was used for Hispanic patients.

everything, and another 6% lost everything except their car.

Socioeconomic problems created by the flood are shown in Table 3. A third of the respondents (34%) reported that a member of their household lost two or more weeks of work because of the flood. Additionally, almost one in every ten patients (9%) reported that a member of the household lost a job permanently. Interestingly, only about half of households (51%) directly affected by the flood (that is, sustaining property loss or damage) reported loss of employment, compared to more than two-thirds (69%) of those who were indirectly affected. A larger proportion of households directly affected by the flood (19%) reported permanent job loss compared to those indirectly affected (5%), possibly reflecting the magnitude of the economic impact in areas suffering greater property damage. Over 100 respondents reported taking flood victims into their home. Not surprisingly, a smaller percentage (23%) of respondents who were directly affected by the flood were able to accommodate others, compared to 49% of those who were indirectly affected.

Table 3. Socioeconomic impact of Hurricane Floyd flooding

	All respondents (n=539)	Respondents affected by the flood		
		Directly (n=222)	Indirectly (n=103)	Total (n=325)
Lost ³ 2 weeks of work	184 (34%)	113 (51%)	71 (69%)	184 (57%)
Lost job	48 (9%)	43 (19%)	5 (5%)	48 (15%)
Took someone into home	102 (19%)	51 (23%)	51 (49%)	102 (31%)

Table 4. Self-reported barriers to health care and changes in family health status by family flood exposure

Barriers to care and health problems	Directly affected (n=222)	Indirectly affected (n=103)	All (n=325)
Loss of medication or medical devices	58 (26%)	7 (7%)	65 (20%)
Paying for medical care	49 (22%)	16 (16%)	65 (20%)
Finding time for clinic visits	53 (24%)	5 (5%)	58 (18%)
A worsening health problem	51 (23%)	8 (8%)	59 (18%)
Finding transportation to clinic visits	47 (21%)	7 (7%)	54 (17%)
A new health problem	44 (20%)	7 (7%)	51 (16%)

The proportion of patients who reported barriers to care or a change in health status of a family member because of the flood is shown in Table 4. Patients who were directly affected by the flood were more likely to report barriers to care than those indirectly affected; 26% of patients directly affected reported loss of medicines or medical devices; 24% had difficulty finding time and 21%, trouble finding transportation to the clinic. About 1 in 5 (22%) had trouble paying for medical care because of the flood. A small percentage of families who were indirectly affected by the flood reported problems with finding time for (5%) or transportation to clinic visits (7%), but one in six (16%) had problems paying for care. Some problems may have arisen from the efforts of indirectly affected flood victims to care for others who suffered greater losses. The seven indirectly affected patients who claimed loss of medications or medical devices because of the disaster apparently misunderstood or misread the question.

Patients who were directly affected by the flood reported more family health problems than those indirectly affected; 20% of those directly affected reported that they or someone in their household had developed a new health problem, and 23% said that pre-existing health problems were worsened "because of the flood." In contrast, 7% of those who were indirectly affected reported that a family member developed a new health problem because of the flood, and 8% said that old health problems had worsened.

Discussion

This report documents some of the ways a flood disaster impacts an adult primary care population. The findings are worrisome in their own right, but are even more troubling when considered in light of the pre-existing health and socioeconomic problems of the region.¹⁴ Social problems (poverty; unemployment; family stress) are well known determinants of population health.¹⁶ The devastating losses that followed Hurricane Floyd compounded the already poor socioeconomic conditions in eastern North Carolina.¹⁴ The lack of economic resources will make recovery extremely difficult, if not impossible, for many residents of the area. The stress and strain associated with recovery efforts may explain some of the health problems reported by flood victims. Many of those families who were not directly flooded still faced burdens such as the temporary loss of income and the stress of caring for flood victims. The perceived health problems of flood victims might have been worsened by barriers to care created by the flood, as reported by a large proportion of respondents in this study. During clinical encounters, health care providers should consider whether the psychosocial stress of disaster survival is an underlying cause of health complaints and should attempt to address these issues. Our findings suggest that primary care providers should assess post-disaster needs, conduct long-term health surveillance, and offer referral to sources of social support after natural disasters.

There are several points to consider in interpreting a study such as ours. We used a convenience sample derived from clinic attendees. Convenience sampling is a quick, low-cost, and simple way to gather preliminary data, but the findings may not be representative of the larger population. Our data should not be generalized to other clinical or disaster sites without comparing demographic profiles of affected populations, and the circumstances surrounding different natural disasters. Another point is that our response rate was somewhat low (59%). We have no way of knowing whether respondents and non-respondents differed in terms of their experiences during the flood. However, the impact of the disaster on patients seen in the clinic during the study period would still be substantial even if none of the non-respondents had been affected by the flood. Finally, we relied on respondents' subjective assessments of property damage and losses rather than a standard definition, but we have no reason to suspect that respondents reported trivial damages. We also relied on respondents' perceptions of barriers to health care and health problems caused by the flood, so it is possible that health problems attributed to the flood were unrelated to the disaster. Nevertheless, recognizing a patient's perspective on causes of an illness helps ensure that relevant health concerns and needs are addressed. Despite these limitations, our study provides useful information about the impact of major flooding on a primary care population.

Conclusions

The eastern North Carolina flood of 1999 caused significant social, economic, and health problems for the clinic patients who participated in our study. The long-term consequences of the disaster are unknown, but are likely to be far-reaching. Given the frequency of hurricanes and other adverse weather events in North Carolina, health care providers across the state need to help their communities prepare for such events. In the aftermath of a disaster, providers need to be ready to monitor and respond to both immediate and long-term health and social needs of their patients.

Our findings suggest that clinicians should consider the exceptional stresses associated with survival and recovery from disaster when making diagnostic and therapeutic decisions for flood victims. Immediately after a flood, patients will need to replace lost prescription medications and devices like oxygen tanks and wheelchairs. Patients will certainly have problems keeping appointments during the height of a disaster, but loss of automobiles means that transportation problems may persist long after. Many will have problems paying for care, especially those who were poor and uninsured before the disaster. Some patients will report new health problems or worsening of pre-existing conditions because of the disaster, and these perceptions are certainly worthy of attention. Providers who take time to assess their

patients' needs and concerns after a disaster, and who keep these problems in mind during clinical encounters, will be in a better position to identify, prevent, and respond to flood-related health problems.

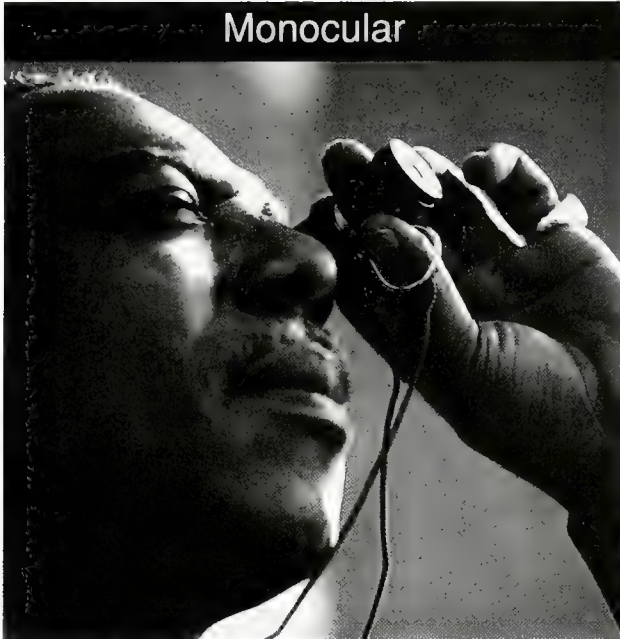
Acknowledgements. We thank the patients of the Family Practice Center for sharing their experiences during the flood. We appreciate the work of the patient services representatives, nursing staff, and physicians who distributed, reviewed, and collected surveys. We also thank Dr. Mark Darrow for his help in planning the project, and Vahe Badalyan for assisting with data entry.

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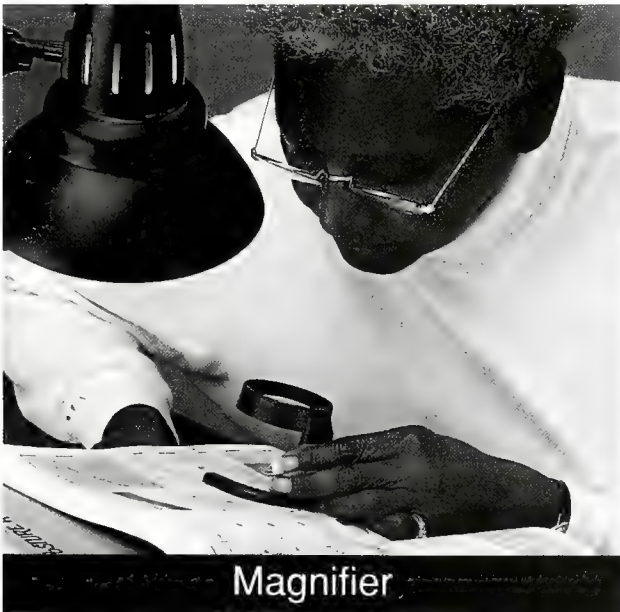
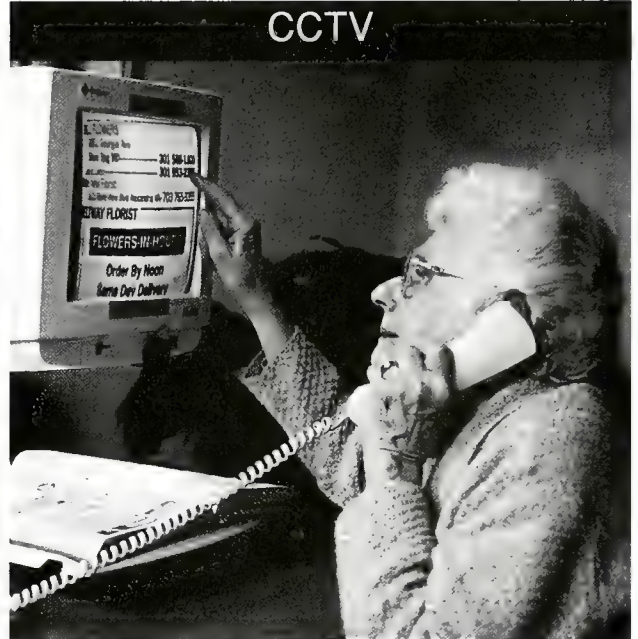
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For people who can't see well, here are some things to look into.

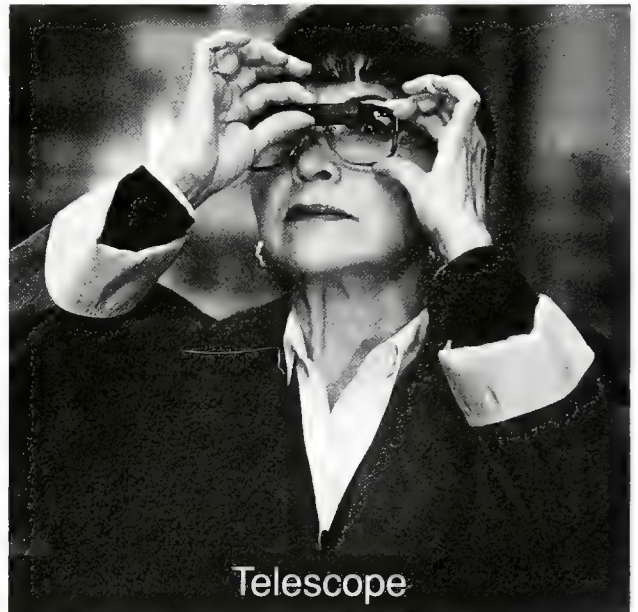
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WILLIAM B. BLYTHE, MD
1928-2000

A native North Carolinian, I learned as a child that our state flower was the dogwood and our state bird was the cardinal. I learned how we came to be called Tar Heels, and I could even hum a few bars of "The Old North State." I learned from our license plates that we were the "Variety Vacationland," then "First in Flight." Only much later in life, however, did I learn that our official state motto is *Esse Quam Videri*. No advertising slogan this; these are real words written by real men – words to live by. This Latin phrase means "to be, rather than to seem," and it graces the Great Seal of the State of North Carolina. By legal statute, "no other words or other embellishments shall appear on the seal." The man who introduced these words to me was Dr. William B. Blythe of the University of North Carolina.

The sadness accompanying Dr. Blythe's untimely death in December may be tempered somewhat by a reflection on his prodigious legacy. He taught generations of physicians and scientists how "*Esse Quam Videri*" could be as central to a person's life as it is to our state seal. I was one of thousands of students and colleagues with whom Dr. Blythe shared his vision of the word and spirit of this phrase during his more than 50 years at the University of North Carolina School of Medicine.

Dr. Blythe was absolutely successful but absolutely humble. He was elegantly simple and simply elegant. He was completely without pretense. He took everything he did seriously but never took himself too seriously. He was genuinely curious and inquisitive about everything and anything. He never cared about appearances or short-term gains, but instead had the wisdom and perspective to steer the University of North Carolina toward rock-solid, durable excellence. He spoke and wrote from the heart. He taught us

continued on next page

by example what it meant to be the real thing – a real doctor, a real scientist, a real teacher, a real leader, a real citizen, a real husband, father, son or brother, and a real friend. *Esse Quam Videri* was never more truly embodied than in William B. Blythe.

Dr. Blythe's simple, unassuming manner belied the extraordinary depth and breadth of his intellect. He was, in this regard, once again the real thing, a real intellectual. He knew that ideas matter. He knew that ideas need to be communicated. And, perhaps more than anyone I've ever known, he knew that ideas are fun - I mean *really* fun – not pipe-puffing, wine-sipping, amusing kind of fun, but laughing-on-a roller-coaster, jumping-up-and-down-in-a-mud-puddle, joyous kind of fun. Dr. Blythe was a frequent contributor to, associate editor, and lately chair of the editorial board of this journal over many years. He used it to communicate his ideas to readers across the state in the same deeply joyous and fun way he communicated them in person to his students.

Who but Bill Blythe would choose to teach his students about electrolyte balance by analyzing the homeostatic problems faced by a shark in a salt water environment? Who but Bill Blythe would explain the epidemiology of hypertension with an exhaustive discourse on the history of salt from the paleolithic era to present-day fast-food culture? Who but Bill Blythe would write a letter to a major medical journal pointing out that the authors of an article on a particular form of acute renal failure failed to cite the first report of this phenomenon – a Biblical case of poisoning by ingestion of tainted wild-fowl and hemlock? And who but Bill Blythe would, after years of highly technical, seminal scientific publications, leave as the last entry on his *curriculum vitae* a paper from this journal entitled, "Some thoughts on keeping our noble profession professional and noble"?

My favorite story about Dr. Blythe took place when he was eating with his children in a restaurant. Another patron passed out, apparently from choking. As an academic internist with a bent toward therapeutic nihilism, Dr. Blythe was horrified at the prospect of actually having to intervene physically to help the man. He was greatly relieved, therefore, when a muscular bystander stepped to the back of the victim's chair to perform a Heimlich maneuver. After numerous attempts, however, the patient was still unconscious and was looking worse and worse. At this point, Dr. Blythe figured he must get involved and, being the good internist he was, he walked up to the victim's wife and took a history.

He learned that in fact the gentleman had just sat down to the table and hadn't taken a bite. Dr. Blythe surmised that he had not choked, but rather fainted. Moreover, the well-intended bystander was exacerbating the situation by impeding venous return (by keeping the victim upright and applying Valsalva-like external pressure to the torso). Once the patient was placed on the floor, he promptly awoke and was fine. Dr. Blythe loved to tell this story to emphasize the importance of taking a history. But he also loved to relate that, when he returned to his table, his children were totally unimpressed because all they had seen him do was talk to a pretty lady.

It is often said at times of passing that one's soul, spirit, or light will live on after death. I believe this as a matter of faith. But, in Dr. Blythe's case, I believe it also as an undeniably manifest scientific fact. This man of ideas left behind four wonderful children who followed his example to become writers, journalists, and doctors. He left behind thousands of students who have Dr. Blythe in their hearts and minds every time they see a patient or carry out an experiment. And he left behind a university that, in part because of his service, will promote the ideals he believed in for generations to come.

Bill deeply loved the State of North Carolina and the University of North Carolina, but he loved his family, friends, students, and colleagues even more. I know he would be pleased if we chose to memorialize him by striving to live in accordance with the motto of his beloved state – *Esse Quam Videri*.

For all his learned ways, Dr. Blythe enjoyed nothing more than a long walk in the woods. He made a notation each year of when he would hear the first wood-thrush call in the Spring – always, he would tell me, within a day or two of April 17th. I'll miss you, Bill, when I hear the first flute-like call this April, but I know you'll be smiling to know that I made the notation for you.

David A. Tate, MD, Associate Professor of Medicine
University of North Carolina School of Medicine

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of the North Carolina Medical Society

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The *North Carolina Medical Journal* is a medium for communication with and by members of the medical community of this state. The *Journal* publishes six times a year: in January, March, May, July, September, and November.

The *Journal* will consider for publication articles relating to and illuminating medical science, practice, and history; editorials and opinion pieces; letters; personal accounts; poetry and whimsical musings; and photographs and drawings. Papers that relate to the present, past, or future practice of the health professions in North Carolina are especially pertinent, but manuscripts reflecting other perspectives or topics are welcomed. Prospective authors should feel free to discuss potential articles with the editors.

Manuscript Preparation

Prepare papers according to the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" (N Engl J Med 1991;324:424-8) with the following exceptions: 1) no abstract is needed; 2) no running title is needed; and 3) report measurements in metric units; use of the International System of Units (SI) is optional.

Submit a cover letter and a 3 1/2-inch computer disk that contains the text written in MS DOS- or Macintosh-compatible format. *Also enclose three hard copies of the text for review purposes.* Double space text with one-inch margins. *Please do not "format" the text* (e.g. no variations in type size, no bold face, no italics, no embedded endnotes).

Submit photographic illustrations, in duplicate, as high-quality color 35mm slides or 5-by-7 or 8-by-10-inch glossy prints, or as black-and-white glossy prints (5-by-7 or 8-by-10-inch). Label all illustrations with author's name, number them sequentially according to their position in the text, and indicate the orientation of the images, if necessary. *Do not write directly on the backs of prints.* This can damage them. If figures require printing in four-color process, we may ask the author to pay printing fees or a portion thereof.

Submit tables, charts, and graphs as hard copy *and* include copies on disk, in their original format *and translated as TIFF, PICT, or EPS documents.* Type all figure legends separately. Type and double-space all tables, one to a single sheet of paper. Tables must have titles and consecutive Arabic numbers.

Keep references to a minimum (preferably no more than

15), retaining those that document important points. The "Uniform Requirements" cited above contain reference format. We customarily list the first three authors for "et al"-type references. Authors are responsible for the accuracy and pertinence of all citations.

Avoid abbreviations entirely if possible; keep them to a minimum if not. When used, completely define abbreviations at the first point of usage in the text.

Manuscript Review and Editing

A medically qualified editor reads all manuscripts and, in most instances, sends them out for further review by one or more other members of the North Carolina Medical Society. *Authors' cover letters must include a line that states that their submitted manuscripts are not under consideration for publication elsewhere. It is not the Journal's policy to reprint previously published articles.* Decisions to publish or not are made by the editors, advised by the peer reviewers.

We encourage a relatively informal writing style since we believe this improves communication. Imagine yourself talking with your unseen audience—as long as this doesn't lead you to scientific or linguistic inaccuracy. Be brief, clear, simple, and precise.

We edit accepted manuscripts for clarity, style, and conciseness. Except for letters, authors receive a copy of the edited manuscript for their review and approval before publication. Manuscripts not accepted will not be returned.

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CME Calendar

March 12-16

The Alton D. Brashear Postgraduate Course in Head and Neck Anatomy

Place: Virginia Commonwealth University School of Medicine, Richmond, VA
Credit: 43 hours by the Academy of General Dentistry
Fees: \$450 for practitioners; \$300 for residents
Info: Dr. Hugo R. Seibel, Dept. of Anatomy, VCU: 804/828-9791; fax 804/828-5115

March 22-24

Office Practice of Primary Care Medicine

Place: Mills House Hotel, Charleston, SC
Credit: Up to 18.5 hours, Category 1, AMA
Fees: MDs: \$495; others: \$395
Info: Medical University of South Carolina CME 843/876-1925

March 22-24

32nd Annual Topics in Internal Medicine

Place: Sheraton Hotel Gainesville, Gainesville, Florida
Credit: Up to 19 hours, Category 1, AM
Fees: MDs: \$300; others: \$150
Info: University of Florida CME, PO Box 100233, Gainesville 32610; tel. 352/395-8081.

March 29-April 1

American College of Physicians/American Society of Internal Medicine

Place: Georgia World Congress Center
Atlanta, GA
Credit: Up to 35 hours, Category 1, AMA
Fees:
Info: ACP/ASIM Customer Service: 800/523-1546 ext. 2600; www.acponline.org

April 27-27

4th Annual Duke Conference on Women's Health

Place: Holiday Inn, Research Triangle Park, NC
Credit: Up to 13 hours, Category 1, AMA
Fees: MDs: \$200; others: \$150 (TBC)
Info: Duke Academic Program in Women's Health 919/684-4139; brode002@mc.duke.edu

May 4-6

End of Life Care: Managing Risk and Symptoms Through Communication

Place: Grandover Resort and Conference Center, Greensboro, NC
Credit: Up to 15 hours, Category 1, AMA
Fees: Friday \$115; Saturday & Sunday \$250; all three days \$325
Info: Greensboro AHEC: 336/832-8214; fax 336/832-2851

May 21-22

September 24-25

Clinical Applications of Bone Densitometry (Minifellowship)

Place: Wake Forest University Baptist Medical Center
Department of Radiology
Credit: Up to 14.5 hours, Category 1, AMA
Fee: \$850
Info: Pat Rice, Dept. of Radiologic Sciences, WFU School of Medicine 336/716-2470 or 800/277-7654.

June 11-15

Advanced Cardiovascular Interventions 10th Anniversary Symposium

Place: Westin Resort and Hotel, Hilton Head Island, SC
Credit: Up to 18 hours, Category 1, AMA
Fees: MD/PhD/DO: \$765; others: \$405; after January 31: additional 10%
Info: Carolina Health Care Systems CME: 704/847-8229; email: KingEvents@aol.com

October 13-14

28th Postgraduate Course; The Alexander Spock Symposium

Place: Searle Center for CME, Duke University Medical Center, Durham, NC
Credit: 11 hours, Category 1 AMA
Fees: MDs: \$150 both days (\$100 Sat, \$50 Sun); others: \$90; trainees or emeritus: no charge
Info: Joseph Marc Majure, MD 919/684-2289



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Speaking of Medicine

DIAGNOSIS

The most valuable diagnostic instrument is the passage of time.

—Henry George Miller, 1968

The diagnosis of disease is often easy, often difficult, and often impossible.

—Peter Mere Latham, 1878

Absolute diagnoses are unsafe, and are made at the expense of the conscience.

—William Osler, ca. 1900

The skillful doctor knows what is wrong by observing alone, the middling doctor by listening, and the inferior doctor by feeling the pulse.

—Chang Chung-Ching, ca. 150

In the fight which we have to wage incessantly against ignorance and quackery among the masses and follies of all sorts among the classes, diagnosis, not drugging, is our chief weapon of offence. Lack of systematic personal training in the methods of the recognition of disease leads to the misapplication of remedies, to long courses of treatment when treatment is useless, and so directly to that lack of confidence in our methods which is apt to place us in the eyes of the public on a level with empirics and quacks.

—William Osler, 1902

A sick man may wear a wrong diagnosis around his neck like a millstone, and the doctor's job may be first to undiagnose him so recovery can begin.

—John L. McClenahan, 1962

The physician will use scientific methods, he will for a time dismember his patient—isolate, for instance, his kidneys or his heart and observe their action under very specialized conditions—but in the end he has to put these parts together again in his “diagnosis”—his total conception of the relationships between the patient as a person, the disease as a part of the patient, and the patient as a part of the world in which he lives.

—Thomas Addis, 1948

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<http://www.acponline.org/medquotes/index.html>

Index to Advertisers

American Academy of Dermatology	81
CARE	79
CIGNA	85
Clinic Pro	62
Compusystems	back cover
HeatherCook	79
Cycle of Hope	90
Duke University Medical Center	65
First Citizens Bank	inside front cover
Grubb & Ellis	79
Mag Mutual	57
Med Mutual	inside back cover
National Eye Institute	103
National Multiple Sclerosis Society	111
NC Academy of Physician Assistants	60-61
NCMS Endorsed Programs	80
Nextel	63
Physician Solutions	58
Ponce Moody	73
PS Medware	65
Sabre Capital	62
Sandhills	85
St. Paul Medical	68
Sunset Medical Park	77



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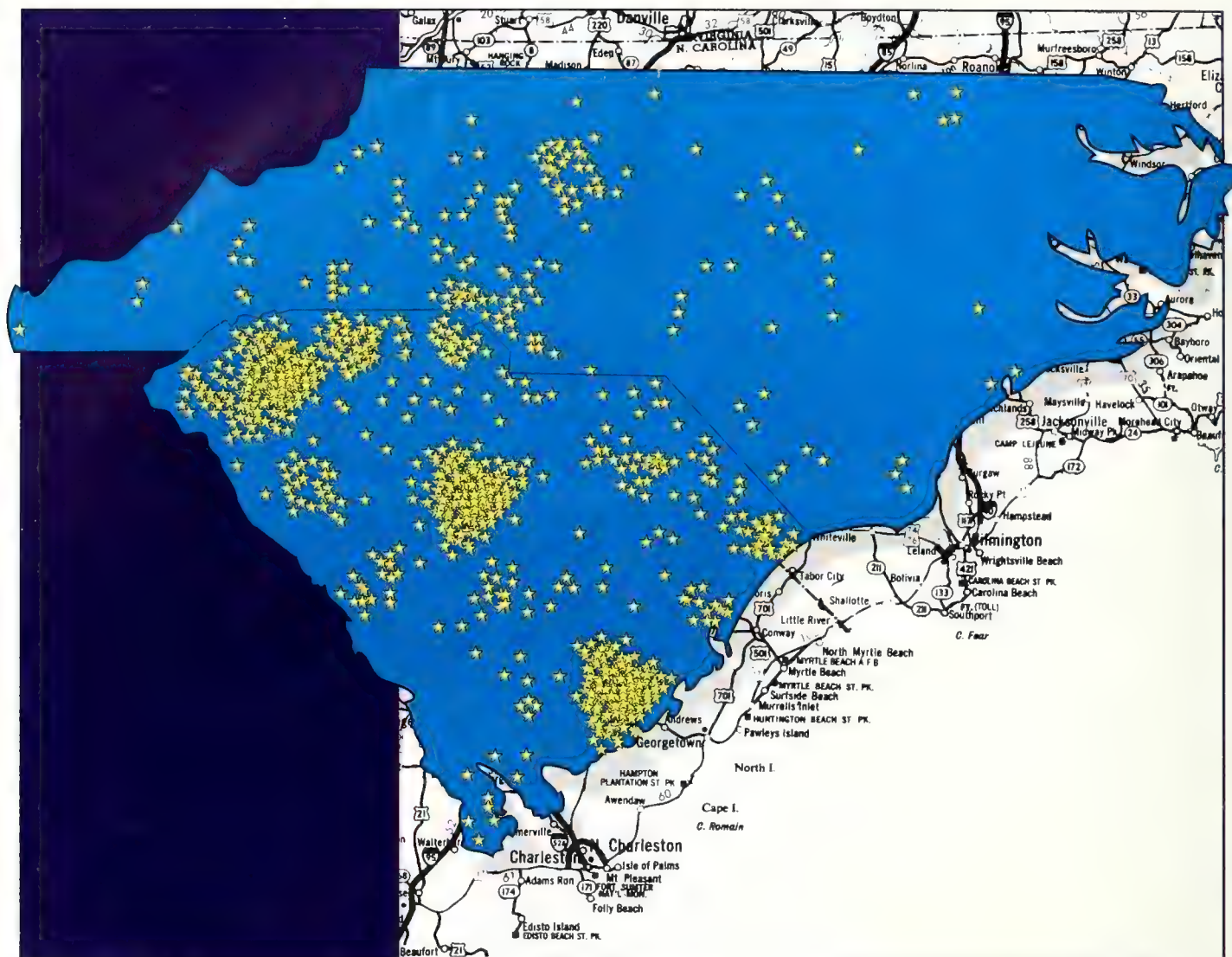
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July/June
2001
Volume 62
Number 3

North Carolina Medical Journal

For Doctors and Their Patients

**Mysterious
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Does It
Make
People
Sick,
Too?**

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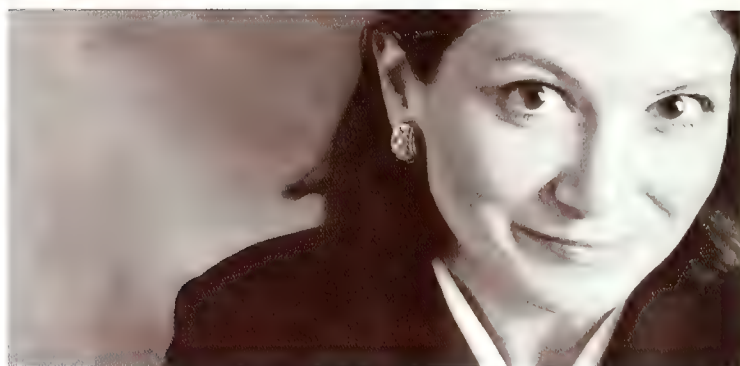
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NORTH CAROLINA MEDICAL JOURNAL

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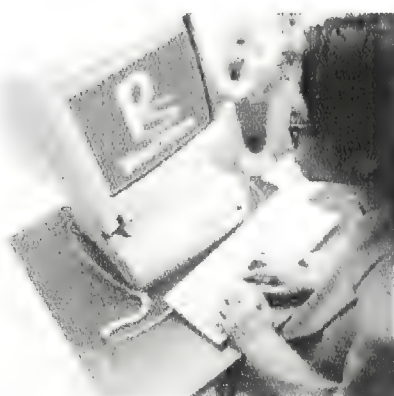
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FOR DOCTORS AND THEIR PATIENTS

May/June 2001, Volume 62, Number 3

Cover: These menhaden, taken from the Neuse River in 1994, show the type of lesions commonly associated with *pfisteria piscicida*. For this photograph and the one on page 126, our thanks to the NC State Center for Applied Aquatic Ecology, with special thanks to Joe Kleinman.

EDITORIAL

- 118 These Are the Times That Try *Francis A. Neelon, MD*

A PIECE OF A NORTH CAROLINA DOCTOR'S MIND

- 119 Hearing the Story: The Persisting Importance of the History in a Technological Age
Michael E. McLeod, MD
- 122 The Education of an Educator *William A. Hensel, MD*
- 124 Therapeutic Abortion *Howard Strawcutter, MD*

HEALTH OF THE PUBLIC

- 126 Is There an Estuary Associated Syndrome in North Carolina? Findings in a Series of Hotline Callers
Marian Swinker, MD, MPH, Deborah Koltai, PhD, Jean Wilkins, PhD, Woodhall Stopford, MD, MSPH

CASE REPORT

- 134 A 32-Year-Old Man with Copious, Watery Diarrhea
Charles S. Smith, Michael Houston, Brian Jensen, Kathryn Mlinar, Charles Toulson, Loyal G. Tillotson, MD, PhD

FIRST-PERSON FIRST AID

- 140 Do It Yourself Medical Mission: A Step-by-Step Approach *Steven Landau, MD, FAAFP*

THE WAY WE WERE

- 154 Mad Dogs, Microbes, and Other Pests: Some Medical Problems in Early Durham *Jean B. Anderson*

REPRODUCTIVE ISSUES

- 158 Emergency Contraception: Attitudes and Practices of Primary Care Doctors in North Carolina
Julie Nielsen Lindsey

MEDICAL EDUCATION

- 163 A Japanese Medical Student in a Medical Clerkship Program in North Carolina *Yuriko Muraki*

DIMENSIONS OF DOCTORING

- 166 Sweet the Sound: Music in Medicine *Brandon Howard*
-

BULLETIN BOARD

- | | | | |
|-----|--------------------------------|-----|-------------------------|
| 116 | Letters to the Editor | 173 | Instructions to Authors |
| 148 | Carolina Physician's Bookshelf | 174 | Classified Ads |
| 152 | Running the Numbers | 175 | CME Calendar |
| 171 | New Members | 176 | Index of Advertisers |

Letters to the Editor

A Great and Delightful Man

To the Editor:

What a wonderful remembrance of Bill Blythe by his colleague, David A. Tate. It is difficult for me to accept the fact that he is no longer with us. He was such a vibrant, warm, cheerful and generous person. My office was near his and I had the good fortune to run into him on frequent occasions. He was a fountain of information including social and political commentary. All with enthusiasm, rectitude, and humor. He was a life-long democrat with a deep and abiding love of his fellow man, but also with the capacity for biting criticism when the need arose. I was often late for an appointment, conference or tee-time because of engaging conversation with Bill Blythe. I miss this great and delightful man.

Robert McLelland, MD
Department of Radiology
University of North Carolina
Chapel Hill, NC 27599-7510

Gratitude in the Face of Frustration

To the Editor:

When I read through the comments of North Carolina physicians in the Report Card from the recent Managed Care Survey, my reaction was mixed. I primarily felt sad, for the overwhelming majority of responses were quite negative, and for a large part angry. But on further reflection I felt quite encouraged that the North Carolina Medical Society had provided a forum for the ventilation of these feelings, and thankful for the very existence of an organization which attempts to sincerely represent our core beliefs.

My own frustration with the many changes which have occurred during my thirty-eight years since graduating from Emory University requires me to work a daily program which I call my "G" or "Gratitude" program. When I interact with patients in my gyn practice, I am reminded of the gift I have received both from my gene pool, and from others. I remember the curiosity and wonder I experienced as a child with an affinity for nature, and I am grateful for Boy Scouts, a high school biology teacher, college and medical school mentors, all of whom nurtured the gift. I also remember the many colleagues and patients who have enriched my life, as well as the gifts of friendship which are priceless. I also, as some

stated, remember the very ill patients with whom I have shared desperate struggles for life and health, and I am grateful for the explosion of technology which has helped us all in the healing business. I believe this technology to be one of the chief reasons for our current dilemma: Can medicine be both a technocracy and a healing art? Dr. E. O. Wilson, Professor Emeritus of Biology at Harvard University and Pulitzer Prize writer, has addressed these issues very well in his most recent book, "Consilience," and I agree with his premise that science and the arts are not only usually compatible, but interdependent.

Thanks to the North Carolina Medical Society for opening a dialog for its membership, and for the *North Carolina Medical Journal* for allowing further discourses.

William S. Farabow, MD, FACOG
High Point Ob-Gyn
400 North Elm Street
High Point, NC 27262

Our Friends Speak Up

From the Editor:

Our friends continue to express their firm support of the *Journal*. A few samples from notes we have received along with recent contributions:

To the Editor:

I believe this journal serves a very special need to the physicians in the state, and that its demise would be regrettable.

Albert Heyman, MD
1216 Woodburn Road
Durham, NC 27705

To the Editor:

I have always enjoyed the *Journal* as a way of keeping up with NC medical news and with friends in North Carolina.

It seems to me that our Society should support the *Journal*. Surely they could spare \$100,000 from all those lobbying efforts. We are so concerned about politics now that we seem to forget about people and their health. Some politicking is necessary, but I believe we have gone overboard and forgotten about some important issues—such as the *Journal*.

Thanks. I guess I should have written earlier, when we had the debate. Hopefully, better late than never.

Jimmie Lee Rhyne, MD
7813 Hardwick Dr.
Raleigh, NC 27615

To the Editor:

Thanks so much for your efforts to keep the Journal a viable and very useful journal. Our profession needs this publication in North Carolina.

R. H. Shackelford, MD
201 West Pollock Street
Mt. Olive, NC 28365

We encourage and welcome letters from our readers. Type and double-space all text, keeping length to under 500 words. Longer letters may be considered for publication as commentaries. We reserve the right to edit and abridge all copy. Send by mail: North Carolina Medical Journal, Box 3910, DUMC, Durham, NC 27710; by fax: 919/286-9219; or by email: nash0004@mc.duke.edu.

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These Are the Times That Try

State medical journals are fragile vessels—in North Carolina as in other states. Already the past decade has seen the demise of several long-established state medical journals: New York, Pennsylvania, Florida, Ohio, Virginia. Those journals that survive remain in great peril. The chief problem, of course, is finances. Advertising revenues for medical journals have been shrinking steadily, and new sources of advertising are few. State medical societies feel it is impossible to continue underwriting journal publication out of membership dues. This means that we now depend largely upon the generous support of voluntary donors—most of whom are readers of the *Journal* like you.

Already many readers have made generous (and tax deductible) contributions to the North Carolina Medical Society Foundation, earmarked for *Journal* support. We in the *Journal* office are immensely grateful for the financial help that we have received, but we are still short of sufficient funds to sustain the *Journal* even for the

rest of this year. If we do not have sufficient funds on hand by June 1st, 2001, the Medical Society has decreed that we must cease publication.

If you agree with me that the *Journal* offers a physical emblem of medicine's commitment to a higher goal than mere commerce, I encourage/urge/beg/plead/entreat you to send a donation to the Foundation.

Some readers have asked how much they should contribute. That depends on an unknown—how many people will contribute. But if 300 supporters sent us \$100 apiece today, we would be safe for the rest of this calendar year. That amount is not really very great. On the other hand, great is the silence that will fall if the *Journal* ceases to provide a forum for the thoughtful examination and discussion of medicine as it is practiced in and for North Carolina.

Send to the Foundation, then,

what you can and will. Make sure that your contribution is clearly designated for the *Journal*. Send it today. If you delay, we die.

—Francis A. Neelon, MD



Hearing the Story

The Persisting Importance of the History in a Technological Age

Michael E. McLeod, MD

I have practiced gastroenterology for over thirty years. During this time I have seen a dramatic change in the way doctors evaluate patients. In the 1960s all the gastroenterologist had available were x-rays of the chest and abdomen, and barium studies of the upper and lower intestinal tract. A careful history and physical examination were highly valued. Now, the list of diagnostic procedures is almost endless, and the history and physical examination get short shrift.

In recent years I have been impressed by the seemingly increasing reliance on technology for answers to the patient's story of illness. Increasing time pressure makes it easier to order tests rather than spend the extra time to understand the story. Technology provides objective data and reassures the scientifically trained mind – and even patients may demand a procedure for reassurance. However, the excessive use of technology sends the cost of medical care spiraling upward, and false positive findings lead to additional costs and needless anxiety. Tests too often produce findings that are (incorrectly) assumed to explain the illness, thereby leading to inappropriate treatment including surgery.

The Place Of The History

I contend that a careful history leads to a correct diagnosis 80% of the time, that it helps us choose the right tests to understand the illness, and that it helps to decide whether the findings fit the story. In addition, listening to the patient's story in a non-judgmental and empathic way, reflecting and validating their feelings, begins the process of connecting to our patients and building trust. The end result is better compliance, more satisfaction for patient and doctor, and fewer medical-legal issues. We begin to understand the context of the illness (that is, the "story"); we realize that psychosocial issues can change the biology of the body; we

find revealed how each of us suffers in ways unique to us as individuals.

In the evaluation of abdominal pain, for instance, a normal abdominal computed tomographic (CT) scan may give a false sense of security. The abdominal pain of sickle cell crises, partial small bowel obstruction or mesenteric angina may produce no changes on the CT scan. The following case illustrates this point.

JA, a 70-year-old woman, was referred for the evaluation of abdominal pain of three months' duration. She had lost 30 pounds of weight during the same interval. Physical examination, laboratory data, upper endoscopy, colonoscopy, ultrasound and abdominal CT, and upper gastro-intestinal and small bowel radiographs were all normal. The day of her visit the pain had changed in character. Originally it had come on about 30 minutes after a large meal and lasted 30–45 minutes. When I saw her, the pain had been constant for 12 hours. I suspected intestinal ischemia with subsequent infarction; at surgery the entire small bowel was infarcted, and she died 48 hours later.

There are several causes for pain induced by eating; many had been ruled out by the studies obtained. Careful attention to the story might have prompted the coeliac and mesenteric artery angiograms appropriate in this setting.

Disease Versus Illness

Often we can use technology to demonstrate disease but the "disease" we find is not the cause of the patient's symptoms.

JB, a 75 year old man with end-stage pulmonary disease, was referred for evaluation of abdominal pain that occurred 2–4 times per week, usually after eating. It was associated with a sense of bloating and occasionally partially relieved by belching. The patient rated his pain as 4

The author is Professor Emeritus of Medicine in the Division of Gastroenterology at Duke University School of Medicine. He can be reached by email at anitamikemcleod@aol.com.

on a scale of 1-10 in severity. He was known to have gallstones, but because of his pulmonary status and age surgery carried a high risk.

More important from my viewpoint, his history did not fit the typical story of biliary colic (random attacks of intense pain, rapid in onset, lasting 15-45 minutes, and resolving rapidly), or of cholecystitis (gradual onset of pain, with abdominal tenderness and fever, persisting 5-7 days). I suspected that the stones were an incidental finding and not the cause of his symptoms. Over the next six months, his symptoms dissipated with resolution of a family conflict.

The job for the doctor is to decide when and if the symptoms fit with the objective findings. Asymptomatic abnormalities are common and only the history can help decide when they are the likely cause of illness. A study in the New England Journal of Medicine¹ found a 40% incidence of protruding lumbar disc in a group of 40- to 55-year-old people with no symptoms. What diagnosis would we make if they had come in complaining of a back pain?

Context of the Illness

Psychosocial issues can be important determinants of disease outcome. Concomitant presence of depression, Type A personality with increased hostility, or social isolation can increase mortality during the year following a myocardial infarction by 30-40%.²⁻⁵ Using behavior modification techniques in patients with Type A personality or alleviating social isolation returns the mortality rates to control-group level, even though we do not understand the molecular events that contribute to the increased (or decreased) mortality.

Pain is most often the symptom that brings the patient to the doctor. Pain intensity can be related to three factors: intensity of the stimulus, the coexistence of anxiety or depression, and the meaning of the pain to the patient.^{6,7} The following case history illustrates these points.

JC, a 45 year old man, was seen in an Emergency Room because of substernal pressure pain described by him as 8 out of 10 in severity. His physical examination, electrocardiogram and blood levels of cardiac enzymes were normal. He appeared anxious and belched frequently.

He related the fact that his brother, aged 42, had died of a heart attack two months ago. He talked about that event, and then about his resulting depression and his fears about the nature of his present symptoms. When the cardiac studies were normal, he was told that his symptoms most likely had a gastrointestinal origin (aerophagia leading to gastric distension). The normal laboratory studies and a plausible explanation of his symptoms decreased his anxiety; the intensity and frequency of his symptoms decreased concomitantly. Grief and depression that followed his brother's death, and anxiety about the nature of his chest pain likely induced the symptoms and aggravated their intensity.

Understanding Symptoms

In order to choose the correct technological procedures, and to judge whether the abnormalities found explain the symptoms, it is essential to understand the pathophysiology underlying the patient's story of illness. Developing a time-line and asking about physiological variables that affect the symptom are ways to do this.

By "time-line" I mean: (1) evaluating the rate of pain development; (2) determining the change in symptom character over time; and (3) ascertaining whether the pain is constant or intermittent. The rate at which pain develops can help distinguish its cause. Pain caused by spasm of tubular structures like the ureter or the bile duct characteristically develops rapidly, reaches its peak in minutes, and can resolve rapidly. The pain of small bowel obstruction begins more slowly and reaches its peak over several hours. The pain of cholecystitis, appendicitis, or diverticulitis evolves over many hours to days, and resolves slowly because the underlying process is an inflammatory one. Vasovagal syncope is often preceded by nausea and sweating seconds to minutes before loss of consciousness; cardiac syncope typically occurs without warning.

The changing character of pain over time was illustrated by our patient JA with small bowel infarction. When a patient presents with epigastric pain radiating to the back, there is a long list of possible diagnoses. But if the patient says that, prior to the onset of intense pain for one day, there had been three weeks of intermittent pain, worse with an empty stomach and helped by eating, penetrating peptic ulcer goes to the top of the diagnostic list.

Constant pain may indicate an expanding mass (the rate of pain development depending on whether the mass is a hematoma, an abscess, a malignancy, etc.), neuropathic pain, or a psychological disorder. Individual waves of pain lasting 30 to 90 seconds can be seen with partial small bowel obstruction. Pain can also be intermittent, with attacks of pain that last minutes, hours, or days, interspersed with symptom-free intervals. Getting a clear idea of changes in the character of pain and pattern of the pain, frequency, etc., can narrow the choices of pathological processes that could produce the symptoms.

Physiologic variables can point to the organ involved and, at times, even the type of abnormality. Food-induced pain occurs with intestinal angina, with certain types of peptic lesions, and with partial small bowel obstruction such as is seen in Crohn's disease. Food can aggravate pancreatic pain if already present. Intermittent low abdominal pain occurring in waves lasting 10 to 20 minutes and relieved by passage of stool or flatus points to disease of the lower colon, but cannot distinguish irritable bowel syndrome from, say, partial obstruction due to a recto-sigmoid carcinoma. The colon speaks in few words.

A recent patient examined in our endoscopy unit dem

onstrated the importance of determining physiological variables. After an apparently uneventful (and normal) colonoscopy for polyp surveillance, the patient was soon ready for discharge. The nurse reported normal vital signs, but a complaint of minimally intense right shoulder pain. When asked what made the pain worse (I suspected it was musculoskeletal in origin, in which case movement would make it worse), she reported that deep breathing made it worse. I then realized she had a colon perforation with free air under (and irritating) the diaphragm. Despite a benign abdominal examination with normal bowel sounds, antibiotics were started 45 minutes before we could get an abdominal x-ray to confirm the presence of intra-abdominal air.

The Central Role of the History

The importance of taking a thorough history cannot be over-emphasized. It is our way of connecting with the patient, listening in a nonjudgmental way, reflecting on the meanings and significance of the report, and validating the patient's feelings. The history gives us the chance to apply our intellectual curiosity in understanding the molecular, cellular, and gross anatomical changes that underlie the illness. Our patients too often seek relief outside the medical profession, particularly for chronic conditions. I think it is because they are looking for someone who will listen to their story. Too often, as I look back, I see myself resorting to ordering

some test, writing some prescription, or scheduling some consultation rather than taking the time to really understand what the patient was trying to tell me. More often now I see the history as my challenge. It is my responsibility to hear the words and sense the meaning—at the personal level as well as the physiological one. This, I now believe, is what doctoring is really all about.

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How many journals do you know that give community and university doctors; students and residents; allied health professionals; and patients a common forum to consider the fundamentals of medicine?

Read page 118.

The North Carolina Medical Journal

The Education of an Educator

William A. Hensel, MD

A note from the Editor: This paper by Dr. Hensel is of direct value to the small minority of our readers who are engaged in formal teaching activities. But it has wider value to all doctors, who, after all, are fundamentally teachers. As Dr. Hensel implies, Aristotle grouped medicine with agriculture as the cooperative arts: those capable of assisting nature in producing results that would not happen by themselves. Teaching, too, is a cooperative art—and linked ineradicably with healing.

As I was about to finish my residency, the department chairman offered me a job. I joke that I became an academician because I couldn't sell my house. It is true that the real estate market was flat, but the main reason that I accepted his offer was that I didn't know what to do with the rest of my life. Serendipity thus began what has been, to date, a rewarding twenty-year career as a full-time medical educator.

At the beginning, I was blessed with a mentor who shared my love of teaching. He urged me to develop my ability. When I joined the faculty, he gave me his copies of *Teaching As a Subversive Activity*, by Postman and Weingartner, and *The Adult Learner: A Neglected Species*, by Knowles. My mentor's message was clear: I should strive to become an excellent teacher; I should learn to think outside the box.

Success came early—or so I thought. Medical students voted me the outstanding teacher in our department for three straight years. I did everything that a good teacher was supposed to do. I was enthusiastic, organized, engaging, available, etc. I now recognize that these heady times were my “salad days, a time when I was green in judgement.” No epiphany ushered in my change in perspective. I changed through slow maturation. Only now can I appreciate the magnitude of my paradigm shift.

I have discovered that my job is not about teaching but about learning. When my concern was principally to teach, I had the spotlight on the wrong person. Was I organized?

Had I mastered the content area? Did I deliver an entertaining lecture? Did I hold the attention of *my* medical students and residents? I lectured as often as I could so that I could teach *my* students.

Now I know that it's not about me. The one and only important measure of medical education is how much our medical students and residents learn. Teaching and learning are not synonyms. The latter is far more important than the former.

Sweeping statements make good sound bytes but may not help you *learn*. This article is not about what *I* have to say; it is about what *you* take away from it. Does it lead to introspection? Will your behavior change because you read and contemplate the meaning behind the words? I honestly don't know how best to reach you. I can only hope that a few of my favorite themes may stimulate your own thinking.

First, what do you want the students to learn? Differential diagnosis? indications for hospitalization? the most cost-effective treatment for community acquired pneumonia? But those “facts” always change and, in an era of information technology, are increasingly easy to look up. I hope my students learn more about being a good doctor than mere facts. A quote by Bishop hangs in my office: “... it is habits of mind and standards of performance that we should aspire to teach and not the illusion of enduring facts.” The characteristics of the good doctor include good judgment, the effective use of time in diagnosis and treatment, dealing with

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uncertainty, and tolerance of people whose culture, values, and beliefs are different. Make up your own list. But be clear in your own mind about what is important for students to learn.

I believe that acquiring good values and attitudes are crucial tasks for those entering the medical profession, so I keep an eye on our program's "hidden curriculum." Each department and residency program is a subculture of medicine, whose values and attitudes are evident not just in spoken and written mission statements, but also in the group's actions. What jokes do we tell about others and ourselves? What things do we say about noncompliant or difficult patients? What is our learning environment? Is lack of knowledge ridiculed and, as a result, disguised? Or is lack of knowledge welcomed as an opportunity to learn? I believe that culture does not just happen; it is created. Senior members set the tone for the entire group. What values and attitudes do the students in your program learn? Do you participate in the culture enough to see firsthand what values are being expressed, or are you isolated from the day-to-day activities of your program?

Medicine, at its best, is a cooperative venture. Teaching and learning are, too. The educational program displays its leaders' attitudes about cooperation. Do the members of your own department or residency program pull together for the good of all? Do the faculty internally coordinate their educational activities? How does your program relate to other departments? Do you value and appreciate the strengths of other disciplines of medicine, or do you get ensnared in "turf wars", thus fostering a "them-versus-us" mentality?

Our program's faculty is effective because we work together as a team despite our diverse interests. On our team, younger and older faculty members perform vital roles. Younger faculty often form close bonds with the residents because they share similar life-cycle issues like pregnancy and rearing of young children. The older faculty create the culture of the program through the values they communicate, and through the young faculty and residents that they bring to the program. Shared values and good attitudes lead a program to unite; self-centered values and bad attitudes have the opposite effect. Do senior faculty members create a democratic or autocratic power scheme? Is the work of patient care and time on call apportioned fairly or is it structured for the benefit of the more powerful?

Diverse faculty talents are necessary for an effective program. Just as the right combination of spices makes a good stew, diverse faculty interests are needed to meet the varied educational needs of any program. But spices too strong or combined haphazardly can make the stew inedible. Diversity must not lead to divisiveness. Senior faculty must be the chefs, capitalizing on their experience to create the optimum learning environment.

Attending physicians, always, are role models for the students. And that role modeling extends far beyond the

confines of the hospital and outpatient clinic. Students are desperate to know how to effectively balance their personal and professional lives. Female students and residents, and those in two-career marriages, are particularly in need of guidance. Do you model balance? Do your students see you playing an active role in the lives of your children? How does your program view pregnancy? How does your program respond to a request for paternity leave? What is said about a resident who takes a sick day to care for his or her child? Values and attitudes are not learned or modified quickly. Fortunately, by working in a residency program, I have three years to interact with my learners. Continuity is vital. A one-hour lecture, no matter how dazzling or entertaining, is still too impersonal and brief to make an impact on students' values. Trusting relationships take time to develop. Does your program have adequate continuity of teachers with students? Are you willing to wait patiently for a relationship to develop on its own terms? Or does your program attempt to push students into contrived relationships because of time constraints?

I try to go out of my way to foster relationships with my residents. I don't try to be their buddy; the age difference is too great and that is not what they need from me. I do care about them, not just as doctors but as human beings. I try to spend more time listening than talking to them. I am willing to discuss with them difficult topics like parenting, politics, race, and abortion. When I do, I admit that I, too, am still searching for answers. I try to celebrate with their victories and commiserate with their setbacks. I try to remember to say how proud I am of them and how fortunate I am to work with them. And finally, I encourage them to tread their own path. I want them to outshine me in their own unique ways.

I have come to care more about the accomplishments of my students and the reputation of the program than my individual work. The first inkling of an idea of this article was in my head when my new department chairman came for a visit. He said that he was trying to figure out a better way to honor the senior members of the department for their contributions. I paused before responding and finally said, "That would be nice. But the wise senior members shouldn't really need it." Because he is one of the wise senior faculty, he understood exactly what I meant.

I am a clinical professor and attending physician, a tribal elder now in the culture of medical education. It is my solemn responsibility to pass on the traditions of our profession to the next generation of physicians. I was lucky. I had a mentor who was willing not only to prepare me for my role in academics but also to step aside so that I could become my own person. He cared about me. He knew just what I needed to learn. I am honor bound to try to do the same for those who consider me their teacher.

I repeat. It's not about me; it's about the students. It is not about teaching; it's about learning.

Therapeutic Abortion

Howard Strawcutter, MD

Abortion is a currently hot political issue, contested by partisans on both sides who use a variety of euphemisms and rallying cries that reflect their opposing positions. But one voice that needs to be heard has been silent.

There are few advantages to advancing age, but there is one—called experience. I practiced medicine before *Roe vs. Wade*. It's not right to think that abortions simply were not done before that. They were done in a variety of circumstances. So-called criminal abortionists operated in dirty little upstairs rooms, using buttonhooks or coathanger wire that nearly always resulted in loss of the fetus, maternal sepsis and hemorrhage, and sometimes the loss of the mother as well. On occasion a pregnancy was interrupted under sterile conditions in a hospital operating room. No respectable practicing doctor would presume to make a decision to terminate a pregnancy on his or her own. It would be forbidden by the hospital and open to criminal prosecution. Such decisions were placed on the shoulders of a duly appointed group of medical doctors called the "Therapeutic Abortion Committee." I served on such committees from time to time. We all realized they were something of a farce. The committees were charged with determining whether or not a child or mother could survive if the pregnancy were allowed to proceed. If the verdict was "No," it was our responsibility to advocate interrupting the pregnancy, safely, in the proper environment of a hospital. The problem lay in our lack of physiological clairvoyance. We simply could not infallibly predict the outcome, so that it often came down to a decision made by the mother and her doctor.

The problem was brought home to me graphically by one of my own patients, a young woman with a terrible kidney problem. I had treated her for years. If she had presented pregnant, I would have had no reservations about voting for abortion to protect her life. She sort of disappeared for about a year. When she finally returned, she confessed that she had become pregnant, and knew I would be angry if

I knew. She had moved to Detroit to stay with relatives until she had the baby. She did and returned apologetically to me. We were all so relieved when *Roe vs. Wade* placed the decision to terminate in the hands of the mother and her doctor where it belonged. Almost overnight, a heinous crime became accepted by society. Back room abortionists went out of business.

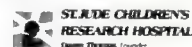
One thing still bothers me about anti-abortionist arguments. It is the little codicil they slip in at the end, saying they oppose all abortion "except in cases of rape or incest, or a threat to the life of the mother." I have visions—nightmares really—about reactivating the Therapeutic Abortion Committees. If we are to have laws against abortion, the ban must be absolute. Abortion must be forbidden regardless of the outcome. Some mothers will die as a result of such legislation, but so be it. No one can predict outcomes absolutely.

Of course, the back-room abortionists will vigorously support such legislation. It would put them back in business. This reminds me of the Anti-Liquor Referendums we have had here in the South—fronted by the ladies of the church, but financed by the bootleggers.



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Is There an Estuary Associated Syndrome in North Carolina?

Findings in a Series of Hotline Callers

Marian Swinker, MD, MPH, Deborah Koltai, PhD, Jean Wilkins, PhD, Woodhall Stopford, MD, MSPH

Since its identification in 1988, the toxic dinoflagellate *Pfiesteria piscicida* has been implicated in fish kills or outbreaks of fish ulcerations in North Carolina.¹ *Pfiesteria* and related dinoflagellate species have been implicated in fish disease and death along the mid-Atlantic and Gulf coasts; in North Carolina such events have occurred primarily in the Pamlico and Neuse rivers. Still, dinoflagellate-related events constitute a minority of documented fish kills in the state.²

Proving the pathogenic role of *Pfiesteria* is not easy. The organism's complex life-cycle produces over 20 flagellated, amoeboid and encysted forms, most of which are not toxic to fish. Fish ulcers may be caused by many pathogenic factors (including fungi), so lesions alone do not necessarily indicate that toxic *Pfiesteria* are the cause.³ A significant fish kill and erratic fish behavior in water contaminated with the dinoflagellate are somewhat more specific. Current techniques can document the presence of dinoflagellates, and in the laboratory we can tell whether the organisms have the potential to kill fish,⁴ but we cannot directly demonstrate that toxin is present in the natural environment or that it is being produced by organisms found at a kill site.

In the laboratory setting, prolonged, repeated human exposure to cultures of toxic *Pfiesteria* can cause adverse effects.⁵ Three researchers, working with such cultures for

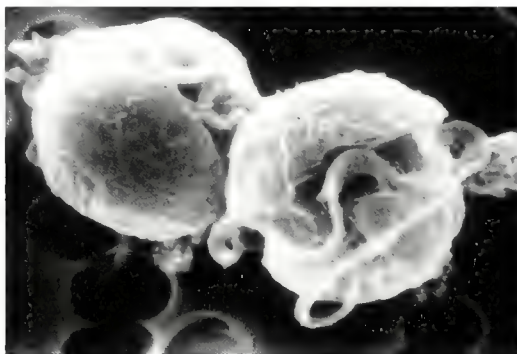
weeks or months, reported mucous membrane and skin irritation, headache, cognitive problems, fatigue, paresthesias, and gastrointestinal complaints. Skin or respiratory contact (or both) was the postulated route of exposure. Most symptoms were transitory, but some persisted for weeks to months. Neuropsychological testing in one case suggested an organic

deficit or an amnesic syndrome, which resolved two months after initial testing. The suggestion that environmentally-exposed persons may develop symptoms has not been documented objectively.

Investigations by the Occupational and Environmental Epidemiology Section, NC Department of Environmental, Health and Natural Resources, could not clearly document human health effects from environmental contact,⁶ in part because of major

methodological problems in defining exposure. At one fish kill site, symptom onset was associated with the presence of a hydrogen sulfide-like smell, such as might be released from fish carcasses.⁶ An independent survey of North Carolina crab fishers documented some their work practices but failed to identify differences in the prevalence of reported chronic health problems or neurological symptoms in those living and working in affected estuaries and those who worked in unaffected areas or in non-fisher community controls.⁷

In August 1997 a fish kill in Maryland was attributed to



Pfiesteria piscicida zoospores. Courtesy of the Center for Applied Aquatic Ecology.

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Table 1. 1997 CDC criteria for *Pfiesteria*-related illness or estuary associated syndrome*

A. Exposure criteria

Exposure to estuarine water characterized by one of the following:

1. Fish with lesions consistent with *P. piscicida* or morphologically related organism (MRO) toxicity with 20% of at least 50 fish of one species having lesions.
2. A fish kill with lesions consistent with *Pfiesteria* or MRO toxicity
3. A fish kill involving fish without lesions, if *Pfiesteria* or MROs are present and there is no alternative reason for a fish kill

B. Clinical symptoms

Reporting any of the following signs or symptoms:

1. Memory loss
2. Confusion
3. Acute skin burning (upon direct contact with water)
4. Three or more of the following:
 - Headaches
 - Skin rash
 - Eye irritation
 - Upper respiratory irritation
 - Muscle cramps
 - Gastrointestinal complaints (nausea, vomiting, diarrhea, or abdominal cramps)

*Adapted from MMWR 1997.¹⁷

Pfiesteria and at least one related dinoflagellate species. Twenty-four people exposed to the affected waters or to fish with lesions reported symptoms of confusion or forgetfulness, headache, skin burning, and skin lesions.⁸ When tested soon after exposure, 19 subjects had significantly decreased performance on neuropsychological (NP) tests used to measure learning (the Rey Auditory Verbal Learning Test or RAVLT), response inhibition, and fine motor coordination and dexterity. The results could not be explained by extraneous factors, and there were no deficits in measures of simple attention or mood.⁸ Most of the many skin lesions found on examination of the index subjects were due to common dermatoses or unrelated conditions. In five individuals with unexplained skin lesions, biopsies showed "variable patterns of inflammation suggesting reactive erythema, allergic, toxic, or eczematous reactions."⁹ Skin burning resolved within 12 hours, and most other acute complaints subsided over a week.⁸ Cognitive problems were more persistent; confusion that occurred within 12-36 hours of exposure gradually improved over 10-12 weeks. After 3 to 6 months, subjects had returned to presumed baseline on NP testing.¹⁰ A later study of callers to a Maryland telephone hotline found significantly more abnormalities on the RAVLT in subjects who had caught or directly handled fish with lesions.¹¹ There was no such association in subjects who had only been swimming or boating in the same waters.

A problem with understanding how neurotoxins may affect those exposed is that high-level or acute exposure may cause overt disease, but low-level exposure may lead to

subclinical behavioral or neurologic changes, undetectable on clinical examination. Formal NP and performance testing can objectively identify such changes, typically by comparing results to established norms or to control groups.¹² Neurotoxin exposure can impair attention, executive function, short-term memory, or visual-spatial ability.¹³ Specific tests, such as the RAVLT, are sensitive detectors of neurotoxin-related deficits.¹⁴ The Neurobehavioral Evaluation System computerized testing system (NES-2), is an accepted standard for occupational neurobehavioral testing, but has not been used as often in non-occupational settings.¹⁵

Chemical exposure can lead to subclinical alterations in central vision, color vision, contrast sensitivity or visual evoked potentials.¹⁶ Visual contrast sensitivity (VCS), which measures the ability to detect visual patterns (for example, gray-on-gray), is a sensitive indicator of neurotoxicity. Deficits in VCS have been found after occupational exposure to solvents, heavy metals, and combustion products. Abnormal results are not generally diagnostic of a particular disease or exposure, but some neurotoxins produce a characteristic frequency pattern in VCS.

In Fall 1997, the Centers for Disease Control and Prevention (CDC), in collaboration with state and federal agencies including the Environmental Protection Agency, and National Institute for Occupational Health and Safety, formulated a case description for Estuary Associated Syndrome (EAS).¹⁷ The definition included the following:

- (1) **Exposure Criteria:** exposure to estuarine water character

Table 2. Self-reported acute symptoms in 11 cases

		Number
Acute symptoms related to incidents or exposures	Yes	6 (55%)
	No	5 (45%)
Skin burning or tingling on water contact	Yes	5 (45%)
	No	6 (55%)
Memory loss or forgetfulness	Yes	5 (45%)
	No	5 (45%)
	No answer	1 (9%)
Confusion or disorientation	Yes	5 (45%)
	No	6 (55%)

Table 3. Reasons why 10 of 11 cases were referred for further evaluation

Conditions	Number
Hyperglycemia*	2
Hypoglycemia	1
Skin disorders	
Basal cell carcinoma	1
Prurigo nodularis	1
Odynophagia; chronic conjunctivitis	1
Enlarged liver, adenopathy (lymphoma)	1
Emotional distress	6
Alzheimer's dementia (probable)	1
Alcohol abuse with psychotic symptoms	1

*one known diabetic; one undiagnosed diabetic with blood sugar of 475 mg/dL

Table 4. Neurological evaluation in 11 cases

Overall peripheral neuropathy rating score

	Number
0 (no neuropathy)	9 (82%)
1 (mild neuropathy)	2 (18%)
2 (moderate neuropathy)	0
3 (severe neuropathy)	0

Neurotoxic complex staging*

Stage	Number
0 (normal)	7 (64%)
0.5 (minimal or equivocal)	3 (27%)
1 (mild)	1 (9%)
2 (moderate)	0
3 (severe)	0

*combines mental status and motor function

ized by a fish kill, or to fish with lesions (affecting 20% of a sample of at least 50 fish of one species), or to affected fish without lesions if *Pfiesteria* or morphologically related organism is suspected.

(2) **Clinical Symptoms:** memory loss or confusion, or acute skin burning on water contact, or three or more other symptoms (Table 1).

These criteria were

retrospectively noted by Maryland investigators to have a negative predictive value of 93%, but a positive predictive value of only 44%, for NP deficits on the RAVLT.¹¹

In response to public concern and to the events in Maryland, the North Carolina State health agency established a telephone hotline to disseminate information and to serve as a case-finding mechanism. The agency recruited specialists from the US Environmental Protection Agency, and the medical schools at Duke University, East Carolina University, and the University of North Carolina at Chapel Hill (UNC-CH) to evaluate the presence of persistent health effects in a series of cases derived from these hotline callers.

Methods

The hotline received approximately 100 calls in 1997; 65 callers were given questionnaires covering demographics, exposure history, and symptoms. Potential cases were identified as those with the greatest exposure to waters where dinoflagellate-related fish kills had occurred during the past 1-2 years, and as subjects with the greatest number and most severe and persistent symptoms consistent with EAS. A numerical ranking system was devised to score exposure and symptoms; 11 of the 27 individuals with the highest exposure and symptom scores were recruited by the state health agency in conjunction with other state agencies. The state health agency also recruited controls for the cases, matched for age (± 3 yr), gender, years of education (± 2 yr), and occupation. Initially, case series participants were asked to identify a friend or coworker as a potential control, but this produced only one pair, so controls were recruited from county employees or local health department personnel. Examinations were conducted in November 1997, three months after the last recognized (and small-to-moderate) North Carolina fish kill involving *Pfiesteria*.² At the time of the examinations, work had begun in Maryland but had not been completed, and long-term effects were in question. Because of the

delayed timing of our evaluations, only chronic or persistent health effects would be detectable. A history of prior symptoms could be noted but not objectively verified.

The multidisciplinary evaluations included standardized medical, occupational, environmental, neurobehavioral, and neurological histories. General medical, dermatological, and neurological examinations, and vision screening were recorded on standardized forms. The standardized neuropsychological test instruments assessed learning and memory, complex information processing, language, visual-constructional abilities, and fine motor skills. Selected elements of the NES-2 computer-based testing system were administered. The NP tests were chosen after discussion with neuropsychologists from Maryland, Virginia and North Carolina, but the NES-2 and vision tests were unique to this study. Control subjects were included to permit interpretation of the NP and vision testing. The standardized neurological examination was adapted from a widely-used clinical classification system¹⁸ that uses history and objective data to produce scores for individual variables like mental status, cranial nerve, sensory, motor, and cognitive function. It also generates an overall summary rating for "neurotoxic complex staging" (see Appendix). Neuropsychological test results were converted to standard scores and percentiles using published normative data. Two neuropsychologists, blind to exposure and confounder status, reviewed the data and assigned clinical ratings by consensus. A clinical rating of 0 denoted "within normal limits"; 1 denoted "borderline to mild NP weakness;" and 2, significant NP impairment. Both the clinical ratings and mean test scores were used to compare the groups. Medical examination data were coded by a physician. The EPA analyzed NES-2 and vision data, excluding data from eyes whose corrected visual acuity was less than 20:70 to avoid confounding by excessive refractive error.

All examiners were blinded to the status of the subjects to minimize bias. Informed consent was obtained from all subjects. Blood and urine specimens were collected, and standard multiphasic biochemical and hematological blood tests were obtained. Aliquots of urine and serum were frozen and stored by the CDC pending development of exposure-related biomarkers. With appropriate consent, a letter was sent to the personal physician of subjects found to have significant, previously unrecognized conditions. One subject who had no designated personal physician was notified directly. Processed subject data were submitted to the Department of Epidemiology at UNC-CH for compilation, and a preliminary report was submitted to the Department of Health and Human Services in Spring 1998.

Table 5. Overall neuropsychological ratings for 11 callers and 11 controls

Clinical rating	Callers	Exposed Callers*	Controls
0 (normal)	6 (55%)	2 (33%)	5 (45%)
1 (borderline)	3 (27%)	2 (33%)	4 (36%)
2 (impaired)	2 (18%)	2 (33%)	2 (18%)

*A subgroup of callers with actual contact exposure to potentially toxic waters

Results

The 11 cases ranged in age from 22 to 74, (mean±SD = 43.7±13.1). Educational level was variable (mean±SD = 12.5±2.1 yr). Most (73%) were male and most were currently married. Three worked as fishermen, two in marine construction, two in general construction, and four in office or other indoor work. Occupational exposure to water was reported by six, and recreational exposure by 10. Six lived within 1000 feet of water. Callers had an average of 201 days exposure to affected waterways during the six warm weather months of the previous two years. The average exposure due to occupational activity was 92 days. It was not possible to verify that subjects had actually been exposed during a recognized dinoflagellate-related fish kill event, only that they had been exposed to water within five miles of a place where such an event had occurred sometime during the past two years. Seven reported contact with fish-kill-affected water or fish with sores; six reported exposure to both; two reported more than one episode. In most instances the elicited histories were incomplete or uncertain in regard to actual numbers of fish affected, percentage of fish with lesions or species affected. This meant that the exposure histories were less specific than specified in the EAS description (Table 1). Solvent or fume or metal exposure was rare; information about hydrogen sulfide gas exposure was not specifically elicited. Six of the 11 subjects reported acute symptoms compatible with the 1997 description of EAS; one other subject reported acute symptoms that began 6 months after the putative exposure (Table 2). All six with acute symptoms reported relevant fish or water exposure (the average exposure was 243 days during the six warm-weather months of the prior two years; an average of 124 days were attributed to occupational activity).

No subject had unique, unidentifiable skin lesions. One had chronic, nonspecific skin sores, biopsy of which revealed chronic irritation and inflammation (prurigo nodularis) attributed to severe, undiagnosed diabetes mellitus. Minor skin problems like eczema and photo-aging were common (found in 46% of subjects). General physical examination and clinical blood tests did not show any group abnormalities. Ten subjects were advised to see their personal physician for a variety of unrelated conditions (Table 3).

Table 6. Acute symptoms and exposure in 6 cases meeting 1997 EAS criteria

Symptom	Number	Onset in days (number specifying)
Memory Loss	5 (83%)	1-14 (n=3)
Confusion	4 (67%)	1-14 (n=3)
Acute Skin Burning with water contact*	5 (83%)	1-4 (n=3)
Headache	4 (67%)	1-14 (n=3)
Skin Rash	6 (100%)	1-30 (n=6)
Eye Irritation	2 (33%)	14-30 (n=2)
Respiratory Irritation	2 (33%)	2-14 (n=2)
Muscle Cramps	3 (50%)	1-2 (n=2)
Gastrointestinal Symptoms	3 (50%)	5-14 (n=3)

*Only one occurred on day of contact

Table 7. Potential confounding factors in 4 exposed subjects with neuropsychological impairment

Impairment level	Potential confounders
Mild/Borderline (2 cases)	a. chronic painful neurological condition, current active systemic neoplasia; b. high dose antihypertensive, sedating medication; severe hyperglycemia
Significant (2 cases)	a. elderly age, possible dementia of several years duration, bilateral peripheral neuropathy and past difficulty in school, past alcohol abuse, inpatient psychiatric treatment; b. active alcohol abuse, chronic painful neurologic disorder

On neurological evaluation, two of the 11 hotline callers had mild peripheral neuropathy that could be ascribed to a known medical condition; one had mild dementia; and one had mild central motor abnormalities. In only one of these four cases were findings severe enough to be rated even "mild" on overall neurotoxic complex staging (Table 4).

To interpret the NP test results, we used data from the controls in addition to published norms. Six of eleven hotline callers (55%) received a clinical rating of normal; three (27%) had borderline to mild abnormalities, and two had significant impairment (Table 5). All subjects classified as abnormal had at least one potential confounding factor, such as a history of educational difficulties, psychiatric symptoms, past or current substance abuse, head trauma, or neurological or medical illness. Hotline callers had a higher prevalence of past and current psychiatric symptoms than controls, but NP clinical ratings of both groups were quite similar.

There is no normative database for interpreting NES-2 tests, so our series could not be compared to population norms. Compared to controls, callers showed large deficits in NES-2 measures of simple reaction time, continuous performance (time), and continuous performance (errors),

but callers performed better than the controls in five other NES-2 measures. Given the small sample sizes, differences between groups did not reach statistical significance. There was no significant difference between groups in visual acuity. The control group scored lower than callers in VCS at each spatial frequency,¹⁹ but the differences did not reach statistical significance.

Symptoms are recorded in Table 6. Five of six subjects who had *actual* exposure reported significant direct skin contact. The sixth stood within six feet of a waterway, looking at a fish kill event on the Neuse River; this was followed immediately by development of a skin lesion (paronychia). Five cases reported acute skin burning on water contact, but only one experienced burning on the day of presumed exposure. The onset of skin abnormalities was immediate or within 1-2 days for four subjects, at four days for one, and at one month for

one. Five of the six reported memory problems; four reported confusion; four reported headache. Two subjects reported eye and respiratory tract irritation; one reported eye irritation on day 2, but no respiratory irritation until over 30 days later; the other reported eye and respiratory irritation, but two weeks after exposure. Muscle cramps occurred within 1-2 days in two subjects. Intestinal symptoms were reported by three subjects, 5-14 days after exposure. All six exposed cases had underlying or pre-existing medical condition(s) that could explain at least some of their symptoms. These included chronic physical illnesses such as lymphoma or diabetes, psychiatric diagnoses, or substance abuse.

Two of the exposed cases had a mild deficit and two had significant impairment on NP testing, but there were potential explanations for all deficits (Table 7). Callers who reported actual exposure were more likely to be rated as abnormal on NP testing, but the differences in frequency distributions did not reach statistical significance compared to the controls (Table 5). The six exposed callers had a pattern of deficits in VCS not seen in the other callers and approaching that seen in the controls.

Discussion

In 1999, the CDC changed the name from "Estuary Associated Syndrome" to "Possible Estuary Associated Syndrome."²⁰ Exposure criteria were modified to include any contact with estuarine water without specifying the nature of the contact or the condition of the water. Under these less restrictive criteria, all eleven callers would meet the criteria for exposure. The 1999 case description includes the same array of symptoms, but specifies that symptom onset must be within two weeks of exposure to estuarine water and must persist at for least two weeks (except that skin rash or skin burning may be of shorter duration).

Our series comprised persons with self-reported symptoms and exposures. Although selected because of their purported exposure, nearly half did not meet the 1997 CDC criteria for exposure. Five of the six who reported acute symptoms had direct skin contact with water. There was no consistent pattern of illness. In many cases, there was a long time-lag between exposure and symptom onset, which raises doubts about the relationship to the environmental exposure. Confounding medical and neuropsychological conditions were common and precluded identifying any caller as an EAS case. Choosing cases based on the presence of severe, persistent neurological symptoms may have resulted in a high proportion of subjects with preexisting, long-term, neurological and neurobehavioral problems.

Our retrospective examination of hotline callers found no evidence of persistent, harmful health effects that could be ascribed to exposure to *Pfiesteria piscicida* or morphologically related organisms (MROs) in the estuarine environment. There was no evidence of an unexplained, persistent health or neuropsychological impairment, nor could an Estuary Associated Syndrome be verified by medical history or objective findings. Given the time-course seen in Maryland, however, any NP effects might have resolved by the time individuals were examined (3-24 months after presumed exposure to dinoflagellate secretions).

Subclinical changes in vision (as reflected in VCS) were found more often in exposed than in unexposed callers. The frequency pattern of VCS deficits identified in symptomatic exposed callers were similar to those observed during an unrelated North Carolina occupational prevalence study (Swinker M L, Koltai D, Wilkins J, et al. Unpublished data). The significance of our results is not known. VCS deficits are nonspecific and are seen in a variety of neurological conditions, both developmental and degenerative, as well as with drug and alcohol use. VCS has not been proven to be affected by exposure to dinoflagellate toxin. Therefore, the significance of the finding and its relationship to the more generalized VCS deficit observed in the controls is not known.

Although we could not identify a verified case of Estuary Associated Syndrome, methodologic limitations preclude drawing other conclusions. Whether significant exposure

means actual water contact at an identifiable event like a fish kill, or is a cumulative process, remains to be clarified. If exposure should prove to be cumulative, length of time from identifiable event to symptom onset would be less meaningful. In this regard, it may be important that callers who were exposed and symptomatic tended to have longer cumulative times of exposure and to have more occupational exposure.

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Appendix. Neurotoxic Complex Staging*

Stage 0	(normal)	Normal mental and motor function
Stage 0.5	(equivocal/subclinical)	Absent, minimal, or equivocal symptoms without impairment of work or capacity to perform activities of daily living (ADL). Mild signs (reflex changes, slowed ocular or extremity movements) may be present. Gait and strength normal.
Stage 1	(mild)	Able to perform all but the more demanding aspects of work or ADL, but with unequivocal evidence (symptoms or signs, Including performance on neuropsychological testing) of intellectual or motor impairment. Can walk without assistance.
Stage 2	(moderate)	Able to perform basic activities of self care but cannot work or maintain more demanding aspects of daily life. Ambulatory, but may require single prop.
Stage 3	(severe)	Major intellectual incapacity (cannot follow news or personal events, cannot sustain complex conversation, considerable slowing of all output) or motor disability (cannot walk unassisted, requiring walker or personal support, usually with slowing and clumsiness of arms as well).
Stage 4	(end stage)	Nearly vegetative. Intellectual and social comprehension and output are at a rudimentary level. Nearly or absolutely mute. Paraparetic or paraplegic with double incontinence.

*Swinker et al, 2001.²¹ Adapted from Tross et al, 1988.¹⁸

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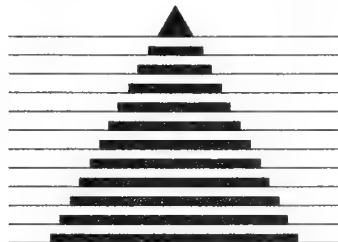
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A 32-Year-Old Man with Copious, Watery Diarrhea

Charles S. Smith, Michael Houston, Brian Jensen, Kathryn Mlinar, Charles Toulson, Loyal G. Tillotson, MD, PhD

A 32-year-old man was examined for severe watery diarrhea and hypokalemia. He had been in good health until 11 months earlier when he noted that he had to defecate approximately one hour after each meal. Bowel frequency increased to 8–10 stools a day, and bowel movements became watery over the next few weeks. Diarrhea decreased if he did not eat, but did not disappear altogether. The patient admitted to defecatory urgency, but denied fever, chills, abdominal pain, melena, or hematochezia. The patient had not recently traveled to other countries, but had been to Mississippi about the time his diarrhea began. No other family members had diarrhea. The patient's medical history included nephrolithiasis, which he attributed to taking oral calcium supplements; he stopped the calcium and had no recurrence of stones. He did not use tobacco, alcohol, or drugs.

After a few weeks of watery diarrhea, the patient's family doctor prescribed a 7-day course of metronidazole. His stools became slightly more formed and their frequency decreased, but they became watery when he stopped the medication. After three months of symptoms, the patient was admitted to another hospital for evaluation of the watery diarrhea, dehydration, and an unintentional weight loss of 20 pounds. A radiographic study of the small bowel showed prominent mucosal folds. Aphthous ulcers were found on colonoscopy, leading to a tentative diagnosis of inflammatory bowel disease. Laboratory evaluation demonstrated *Clostridium difficile* toxin in the stool, but no ova or parasites. Serum anti-gliadin antibodies were absent. After treatment with oral vancomycin, intravenous glucocorticoids, and oral 5-aminosalicylic acid (mesalamine), his stools became more formed and decreased in frequency. On oral mesalamine and prednisone, he averaged 2–3 stools a day over the next few months, but his

stools again became watery after the prednisone dose was decreased to 10 mg per day.

Eight months after the onset of symptoms the patient was seen in an emergency room and admitted to hospital suffering from severe dehydration and hypokalemia. The patient had lost 30 pounds over the previous 7 months. A circinate, erythematous, macular rash had appeared on the chest and groin area two weeks before admission, but subsided without treatment three days later. He denied joint pain, oral ulcers, ocular inflammation, or family history of inflammatory bowel disease. The temperature was 37.4° C, blood pressure was 130/70 mm Hg supine and 120/55 mm Hg standing. The abdomen was not distended, but bowel sounds were hyperactive and there was mild epigastric and right lower quadrant tenderness without guarding or rebound tenderness. A stool specimen was negative for occult blood. An array of laboratory test results (Table 1) were normal except for leukocytosis, hypokalemia, and hypocalcemia. He was treated with intravenous fluids, potassium supplementation, prednisone, and diphenoxylate. Gastrointestinal endoscopy was normal. A duodenal aspirate was negative for *Giardia*. Proximal jejunal biopsies showed non-specific inflammation with monocytes in the lamina propria. Colonoscopy demonstrated an edematous lamina propria of the terminal ileum with minimal to moderate lymphocytic infiltrate but no granulomas. Biopsies of the ascending colon showed a diffuse and severe subepithelial inflammatory infiltrate of lymphocytes, plasma cells, and neutrophils. A single crypt abscess was found. The finding of inflammation in the small and large intestine, and the response to metronidazole, steroids, and mesalamine, led to a working diagnosis of severe chronic active colitis, probably Crohn's disease.

The first five authors, Distinguished Medical Scholars at the University of North Carolina School of Medicine in Chapel Hill, will receive their MD degrees in May. Dr. Tillotson was formerly in the Division of Digestive Diseases and Nutrition, Department of Medicine, UNC-Chapel Hill. He is now in private practice in Rapid City, SD. Address correspondence to Mr. Smith at: chucksmith@aya.yale.edu.

Over the next few days the patient stabilized and was discharged on mesalamine and prednisone.

One month before admission, watery diarrhea returned. The prednisone dose was increased, and azathioprine substituted for mesalamine. Despite these changes, his condition worsened over the ensuing month and he was again hospitalized. Upon direct questioning, he admitted to several episodes of mild flushing over the preceding few weeks. Laboratory tests (Table 1) were again nonspecific. Colonoscopy was normal to the cecum. An abdominal magnetic resonance imaging (MRI) scan revealed two, 6-cm encapsulated hepatic masses filling the left lobe and a single, 2-cm lesion in the right lobe. A 2 cm lesion with radiographic characteristics of an islet-cell tumor was noted in the distal tip of the pancreas. There was no adenopathy. The serum concentration of vasoactive intestinal polypeptide (VIP) level was significantly elevated at 365 pg/ml (normal: <170 pg/ml¹).

Discussion

Our patient's diarrhea decreased, but did not disappear, with fasting—indicating a secretory diarrhea. Dehydration and hypokalemia can occur with any severe diarrhea, and do not point strongly to any particular etiology. The weight loss, fever, nonspecific segmental inflammation, and aphthous ulceration of the gastrointestinal tract suggested inflammatory bowel disease, particularly Crohn's disease. A diagnosis of Crohn's disease was further supported by the patient's partial response to metronidazole, 5-aminosalicylic acid, and corticosteroids. The eventual failure of treatment for inflammatory bowel disease prompted diagnostic reevaluation, leading to the following important findings: mild flushing, continuing hypokalemia, dehydration, and hepatic and pancreatic masses on MRI.

Radiographic Features

An abdominal MRI study was ordered to search for neoplastic causes of diarrhea such as a vasoactive intestinal polypeptide secreting tumor (VIPoma). T1-weighted images (with

Table 1. Laboratory values at present admission and 3 months before admission

	3 months before	Present
Hematocrit	45%	46%
White-cell count (per mm ³)	21,000	7,500
Platelet count (per mm ³)	242,000	235,000
Erythrocyte sedimentation rate (mm/hr)	Normal	Normal
Sodium (mg/dl)	147	145
Potassium (mg/dl)	3.3	3.5
Chloride (mg/dl)	104	104
Bicarbonate (mg/dl)	25	24
Urea nitrogen	Normal	Normal
Creatinine	Normal	Normal
Glucose	Normal	Normal
Calcium (mg/dl)	6.9	9.2
Magnesium	Normal	Normal
Thyroid stimulating hormone	Normal	Normal
Lactate dehydrogenase (U/liter)	680	1690
Total protein	Normal	Normal
Albumin	Normal	Normal
Bilirubin	Normal	Normal
Aspartate aminotransferase	Normal	Normal
Alanine aminotransferase	Normal	Normal
Alkaline phosphatase (U/liter)	NA	166
Gamma-glutamyltransferase (U/liter)	NA	193
Alpha-fetoprotein	NA	Normal
Prothrombin time	NA	Normal
International normalized ratio	NA	Normal
Test for Hepatitis B surface antigen	NA	Absent
Fecal occult blood (Guaiac)	Negative	Negative
Fecal leukocytes	Negative	1+
Ova and parasites	Negative	Negative
Clostridium difficile toxin assay	Negative	Negative
Fecal fat (Sudan stain)	Normal	Normal

fat-suppression and following gadolinium administration), and T2-weighted images (with fat-suppression)² revealed a 2 cm mass consistent with a VIPoma in the tail of the pancreas.³ The three liver lesions showed low signal intensity on T1-weighted, fat-suppressed images (Figure 1) and peripheral ring enhancement immediately after gadolinium administration (not shown), characteristic of metastatic neuroendocrine lesions.²⁻⁴

Further diagnostic definition was obtained by body scanning after administration of radioactively labeled octreotide, a somatostatin analogue. Octreotide has a high affinity for neuroendocrine tumors, and produces useful images within minutes after administration.⁵ In our patient there was increased octreotide uptake in the pancreatic and three liver lesions (not shown), confirming the MRI findings; there were no additional sites of uptake.

Assuming that the radiographic findings and the diarrhea were related, the presence of hepatic masses significantly narrowed the differential diagnosis. For example,

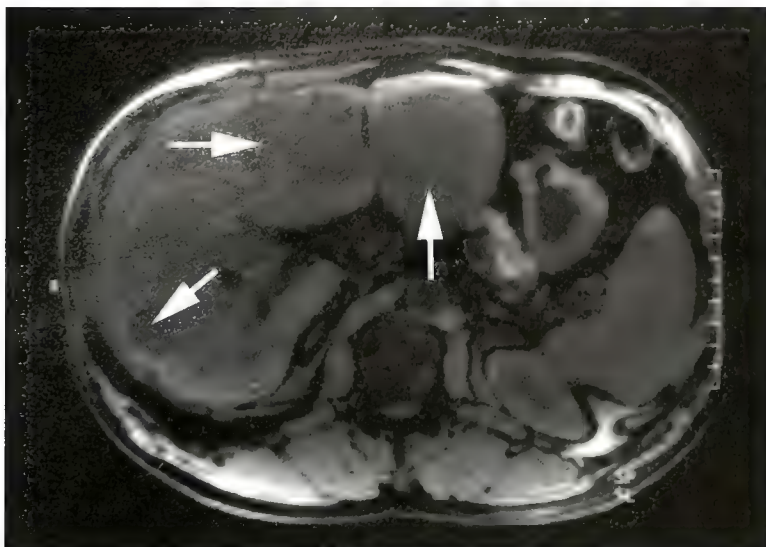


Figure 1. Pre-gadolinium T1-weighted axial image with fat-suppression demonstrates three low attenuation lesions in the liver (arrows).

chronic laxative abuse would produce diarrhea, but not the masses. Primary hepatocellular carcinoma, metastatic pancreatic adenocarcinoma, metastatic colon adenocarcinoma, and metastatic adenocarcinomas from an unknown primary source could explain the liver masses, but these malignancies are not usually associated with diarrhea. Obliteration of the exocrine pancreas by tumor could produce malabsorptive diarrhea, but most of the pancreas in our patient appeared normal. Colon cancer sometimes causes a paradoxical diarrhea related to partial obstruction, and villous adenomas of the colon can cause secretion of massive amounts of fluid and electrolytes,⁶ but our patient's age, the normal colonoscopic findings, and lack of masses other than in the pancreas and liver argues against colon neoplasms.

Hormonally-Mediated Diarrhea

A variety of neuroendocrine tumors cause secretory diarrhea, although it should be emphasized that most of these are quite rare. Zollinger-Ellison syndrome (ZES) should be suspected in patients with recurrent or refractory peptic ulcer disease, peptic ulcer disease associated with other endocrine disorders (suggesting the multiple endocrine neoplasia or MEN syndrome I), and duodenal ulcer in the absence of *Helicobacter pylori*.⁷ ZES is caused by gastrin-secreting tumors; these are located in the pancreas in 25% of cases, and are malignant in 60-90% of cases.⁸ Since our patient had no significant ulcer disease, ZES was unlikely.

A number of pancreatic islet-cell types give rise to hormone-secreting tumors (for example, glucagonomas and somatostatinomas). Glucagonomas always arise in the pancreas, and most induce diabetes mellitus and skin lesions (necrolytic migratory erythema).⁸ About half of all

somatostatinomas arise in the pancreas, and are more likely to be malignant when they do. Like glucagonomas, they are associated with diabetes mellitus, but also with gallbladder disease.⁸ Both tumors are exceedingly rare and are not consistent with our patient's presentation.

Secretory diarrhea resulting from calcitonin secretion occurs in the setting of medullary thyroid carcinoma (MTC).^{8,9} In about 20% of cases, MTC is part of the MEN IIA or IIB syndromes.⁹ Typically, MTC presents as a thyroid nodule, mass, or swelling, with cervical lymphadenopathy, and rarely diarrhea and flushing.^{8,9} Calcitonin can be produced by pancreatic endocrine tumors (PETs),⁸ which, while very rare, would be consistent with our patient's case.

Pheochromocytomas usually do not cause diarrhea, but are occasionally associated with VIP secretion and chronic secretory diarrhea.¹

Pheochromocytomas can arise sporadically or as part of the MEN II syndromes, von Hippel-Lindau disease, or neurofibromatosis type 1 and 2. Clinical features include sustained, treatment-refractory hypertension, hypertensive crises, and paroxysms suggesting seizures, anxiety/panic attacks, or hyperventilation.¹ Diagnosis usually depends on finding elevated 24-hour urine levels of catecholamine metabolites like vanillylmandelic acid (VMA) and metanephrines.¹

Invasion of the gastrointestinal tract by malignant mast cells in systemic mastocytosis leads to increased production of histamine with resulting diarrhea and abdominal pain.¹⁰ A characteristic skin lesion (urticaria pigmentosa) is present in about 75% of cases.⁸ The pruritus and flushing seen in our patient could be the result of intermittent histamine release, but infiltrative hepatomegaly is typical of systemic mastocytosis,¹⁰ not the circumscribed hepatic masses in our patient.

Hepatic masses, flushing, and diarrhea occur in metastatic carcinoid syndrome when liver metastases secrete hormones into the systemic circulation, bypassing the hepatic portal circulation. Approximately 90% of carcinoid tumors arise in the gastrointestinal tract, usually in the appendix and ileum.¹¹ Carcinoids can secrete a variety of products, including 5-hydroxytryptamine (serotonin), histamine, corticotropin, substance P, kallikrein, prostaglandins, and VIP.^{11,12} Secretory diarrhea is caused by one or more of these hormones. Flushing is the most common symptom (in 90% of cases); other symptoms include bronchospasm (wheezing), abdominal pain, telangiectasia, heart-valve disease (usually right-sided), and pellagra (because overproduction of serotonin depletes tryptophan normally used in nicotinic acid synthesis).¹¹ Diagnostic evaluation should begin with the measurement of urinary 5-hydroxyindoleacetic acid (5-HIAA, a serotonin metabolite). This test has a sensitivity of 73% and specificity of 100%.¹²

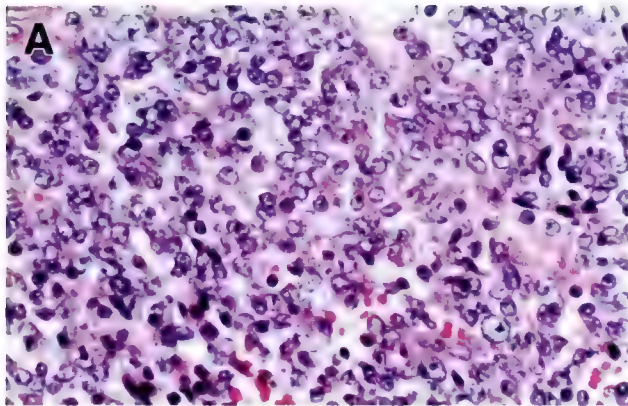


Figure 2A. H&E stain of liver lesion shows complete hepatocyte displacement by uniform, round neoplastic cells with hyperchromatic nuclei and mitotic figures.

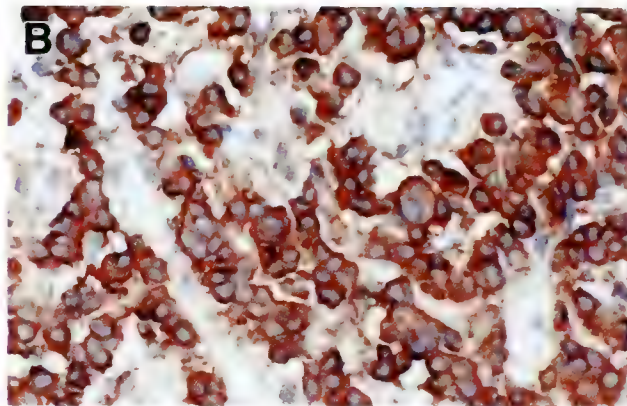


Figure 2B. Immunohistochemical stain of same region of liver lesion shows characteristic synaptophysin (brown) distribution within neurosecretory granules.

The most likely explanation for our patient's chronic secretory diarrhea, pancreatic and hepatic masses is a pancreatic VIPoma with liver metastases. Features consistent with this diagnosis are the chronic, watery, secretory diarrhea leading to dehydration, weight loss, and hypokalemia; flushing; and the pancreatic mass. The diagnosis is also suggested by large-volume diarrhea, usually greater than 1 liter per day. The abnormally elevated serum level of VIP was entirely consistent with VIPoma, and led to ultrasound-guided biopsy of the largest liver mass to determine whether it showed features typical of all pancreatic neuroendocrine tumors (infrequent mitoses and cells generally representative of a low grade neoplasm¹³). Hematoxylin and eosin (H&E) stain of the biopsy specimen (Figure 2A) showed complete hepatocyte displacement by uniform, round tumor cells with hyperchromatic nuclei and mitotic figures.

Immunohistochemical staining against synaptophysin (Figure 2B) revealed characteristic synaptophysin (brown) distribution within neurosecretory granules that is consistent with a metastatic neuroendocrine tumor. This result, in combination with the elevated serum VIP levels, is diagnostic of metastatic VIPoma and makes it unnecessary to stain for VIP.^{3,14} The pancreas was excised; histopathologic evaluation showed a microscopic neuroendocrine tumor in the distal tail of the pancreas (not shown). In addition, multiple neuroendocrine tumor emboli were found in blood vessels of adjacent mesenteric fat, creating a 2 cm tumor aggregate directly corresponding to the MRI and Octreoscan results.²

VIP-Secreting Tumors

In 1958, Verner and Morrison¹⁵ first described a syndrome of profuse watery diarrhea, hypokalemia, and hypochlorhydria associated with a pancreatic tumor. They speculated that humoral products released from the tumor caused the clinical manifestations, but they could not identify the circulating

factor. The syndrome has been called the Verner-Morrison syndrome, pancreatic cholera, and WDHA (watery diarrhea, hypokalemia, and achlorhydria) syndrome. Subsequent investigators found that serum levels of VIP were consistently elevated in patients with this syndrome, but only in 1983 was VIP shown to be the etiologic agent, rather than merely an effective serum marker.¹⁶

VIP, a peptide consisting of 28 amino acids, is released from nerve endings in the mucosa and smooth muscle of the intestine. The amino acid sequence bears significant homology with the sequences of both secretin and glucagon. As the name implies, VIP was originally thought to act primarily on blood vessels, but subsequent investigation demonstrated numerous other functions for VIP - relaxation of the smooth muscle of the gut, stimulation of intestinal bicarbonate and chloride secretion, and inhibition of gastric acid production. VIP appears to affect intestinal luminal contents by inhibiting electrolyte reabsorption from the ileum and by stimulating secretion in the colon. In nearly all cases, the final result is the recognizable syndrome of secretory diarrhea, dehydration, weight loss and hypokalemia. The stools are both watery and voluminous, with 100% of patients producing more than one liter of stool per day, and 70% of patients producing up to three liters per day.⁸ Hypokalemia, which can be severe, even life threatening, results from intestinal potassium wasting, although aldosterone secretion (supposedly induced by VIP-mediated stimulation of renin) may play a role. Hypochlorhydria, present in 70% of cases, is attributed to VIP-induced suppression of gastric acid secretion. Patients frequently complain of painful abdominal cramping, and 20% complain of flushing,¹ attributed to the vasodilatory effects of VIP.¹

The age incidence of diagnosed VIPoma follows a bimodal distribution, with one peak in early childhood and a second peak at about fifty years of age.¹ Like many neuroendocrine tumors of the gastrointestinal tract, VIPomas often are diagnosed only after a long delay due to their relative

rarity (an annual incidence of only 1-2 new cases per 10 million population). Definitive diagnosis requires clear demonstration of elevated serum VIP levels (usually 4-5 times the upper limit of normal) during a symptomatic period.¹⁷

A marked elevation of plasma VIP strongly suggests the diagnosis of VIPoma, but the condition is so rare that use of this test is not warranted in the initial work-up of chronic diarrhea. One study of 192 patients with chronic diarrhea found that measuring serum VIP levels yielded a positive predictive value of only 0.3% and a specificity of 55%. Prolonged fasting, inflammatory bowel disease, small bowel resection, radiation enteritis, and chronic renal failure may raise serum VIP levels.⁸

In cases of suspected VIPoma, it is essential to identify and localize the tumor. In adults, 90% of these tumors are found exclusively in the pancreas (75% in the tail). Rarely, VIPomas arise in other tissues of neural crest origin such as the adrenal glands.⁸ Tumors can be localized by computed tomographic (CT) scanning, but this is losing ground to other imaging modalities such as MRI. Advances in nuclear medicine have offered additional ways to image tumors. Somatostatin Receptor Scintigraphy (SRS) depends on the fact that VIPomas, like other pancreatic neuroendocrine tumors, express a high density of somatostatin receptors. Radioactively labeled somatostatin analogue (octreotide) bound to these receptors provides images with a diagnostic sensitivity of 80% in the detection of primary VIPomas.¹ Given the fact that 40%-70% of VIPomas are metastatic at initial diagnosis,⁸ adjacent tissues should be carefully scrutinized, with particularly thorough inspection of the liver.

The prognosis for patients with VIPomas has been rather poor. Cardiac death (due in part to hypokalemia) and renal failure (due to profound dehydration) cause many of the deaths. Recent advances in diagnosis and treatment have significantly improved survival.

Medical therapy of diarrhea caused by pancreatic neuroendocrine tumors aims to decrease the effects of excess hormone secretion. For example, excess gastric acid secretion produced by gastrinomas can usually be controlled using proton pump inhibitors like omeprazole or lansoprazole. For VIPomas, somatostatinomas, and glucagonomas, long-acting somatostatin analogs such as octreotide are the drugs of choice.^{8,18} Somatostatin analogs may actually offer antiproliferative effects. Supporting evidence for this assertion consists primarily of case reports and data from retrospective studies; two prospective studies have demonstrated tumor stabilization (but not tumor regression) in 40-50% of patients treated with octreotide.¹⁹ Many patients respond initially to somatostatin analogs, but most tumors become resistant to therapy within a year. Furthermore, rare side effects are associated with octreotide (pain at injection site, diarrhea, steatorrhea, flatulence, gallstones, and nausea).¹⁹ Nearly half of neuroendocrine tumors of the pancreas are nonfunctional and are generally not treated with somatostatin analogs.

Patients with nonfunctional tumors and those who have failed somatostatin analog therapy may be treated with a variety of conventional chemotherapy agents. A recent study showed significantly improved objective response (69% vs 45%) and median survival (2.2 vs 1.4 years) in patients treated with streptozotocin plus doxorubicin compared to those treated with streptozotocin plus 5-fluorouracil.²⁰ Another study demonstrated a 67% response rate in patients with anaplastic neuroendocrine tumors treated with etoposide and cisplatin.²¹ All these therapies had considerable side effects including nausea, leukopenia, anemia, thrombocytopenia, alopecia and neuropathy.

Because interferon-alpha can stimulate natural killer cell function and control tumor secretion and growth, it was used in 1982 to treat carcinoid tumors.²² According to a systematic review of the literature, interferon-alpha induced a biochemical response in 44%, subjective improvement in 65%, and reduction of tumor volume in 11% of patients with neuroendocrine tumors.²² In several small studies with differing patient populations, the median survival of patients with carcinoid syndrome treated with interferon-alpha was 80 months, compared with 8-12 months for historical controls treated with conventional chemotherapy. Dose-dependent adverse reactions to interferon-alpha included "flu-like" symptoms, weight loss, fatigue, anemia and liver dysfunction.

Another therapeutic option for managing hepatic metastases of neuroendocrine tumors is hepatic artery chemoembolization. This therapy relies on the fact that normal liver parenchyma is primarily supplied by the portal vein, whereas hepatic tumors derive most of their blood supply from the hepatic artery. This means that embolization of the hepatic artery (using Gelfoam, coils, or iodized oils) deprives tumor cells of blood supply while sparing normal liver.²³ The treatment has proven beneficial for some primary hepatic tumors and a variety of metastatic lesions.²³ Embolization may be repeated as indicated for worsening symptoms or tumor progression. One study of 24 patients demonstrated a 50% reduction in tumor size in 8 patients with liver metastases from endocrine tumors; the median duration of response was 14 months.²⁴ The procedure is associated with few adverse responses although abdominal pain, fever, and transient elevations in liver enzymes do occur.²⁴

Cryosurgery destroys tumors by freezing tissue under ultrasonographic guidance. Experienced surgeons may safely use cryosurgical ablation in patients with tumors in multiple lobes, tumors adjacent to major vessels, or those with limited hepatic reserve.¹⁸ The technique can dramatically relieve symptoms, and significantly reduce tumor markers in patients with metastatic VIPomas, glucagonomas and medullary thyroid cancer resistant to conventional therapy. It is a useful adjuvant in symptomatic patients.²⁵

Conclusion

Our patient had typical symptoms of the VIPoma syndrome: treatment-refractory, watery diarrhea, hypokalemia, and dehydration. As is not unusual, diagnosis was delayed almost a year, in part because these rare tumors are not clinically suspected. Our patient's case illustrates the fact that the diagnosis, once entertained, can be substantiated by measurement of serum VIP levels and appropriate imaging studies.

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Do It Yourself Medical Mission

A Step-by-Step Approach

Steven Landau MD, FAAFP

So you want to be a hero? OK, here's how to do it. Wrap yourself in glory and bravery, and take your medical skills and your bag, and go to a third world location where they really need you. Bring people with you, preferably skilled—you'll have a great time, become famous, and feel like you've lived and practiced medicine for a reason. Even more, you'll be grateful for what we have in the US, even the HMOs. How to do it? Here's how:

1. Identify a country, preferably one whose language you speak at least partially. Arrange for translators, either locals or in the group traveling with you.

2. Find an organization, one whose spiritual or religious values are similar to yours; at least, be sure there is no conflict. The organization must have people already on the ground at the site you will visit. I usually go with AMURT (Ananda Marga Universal Relief Team), a group of yoga and meditation practitioners who want to serve the world (202/829-8676).

3. Determine whether they need you. The on-site people will help with this. Do not trust governments to help in this or in almost anything else, unless you or someone else

has made personal and friendly contact and have demonstrated that the contacts are reliable.

4. Assemble a team of like-minded people with whom you will work both here and at the site. The team should be flexible, should like to sing and dance (this may be the only resource you will have in times of difficulty), and should be

physically and emotionally tough enough to endure physical hardship.

5. Get colorful T-shirts—with logos—so that you can identify one other in a crowd. T-shirts build *esprit de corps*, and you can easily use them to deputize and inspire the locals.

6. Make worker's badges, preferably with a photo, that will get you behind police lines, as well as home base address, phone,

and Federal ID number for tax donation purposes. These should be laminated (you can do this in the field using transparent Contact paper), with a pin to affix it to the shirt. Business-card size works well because it can be kept in your wallet or worn on a shirt.

7. Settle on the scope of your mission. What is your goal? My guru once told me, "Do something concrete for suffering humanity." This is my guideline; everything else is gravy.



Figure 1. The author, wearing his AMURT t-shirt, dispenses medications to patients in a makeshift clinic in a Venezuelan village. March 2000.

The author is in family practice in Kenly, NC. He can be contacted at 400 Englewood Dr., Kenly 27542. Telephone: 919/284-4149; email: elandau@mindspring.com

8. Establish a time line. How much time can you spare? Plan on many hours packing trunks, equipment and supplies. Plan for some recovery time after you come back home.

9. Buy or beg footlockers in which to store your equipment and drugs. They cost about \$30, are easily transportable, stackable, lockable, and usually hold 70 pounds—the maximum allowed by airlines. Footlockers made by Concourse are available at K-mart, Wal-Mart, and elsewhere. For \$40 you can get one with wheels, but the rolling versions don't stack well.

10. Collect medicines. You can buy drugs, but it is cheaper to get donations from local pharmacies, drug representatives, and drug companies. All will be happy to help, but often need several weeks' advance notice. Drug company phone numbers are listed in the PDR. Medicine samples can be obtained from doctor friends or raided from your own sample closet. A high-quality emergency kit (containing medicines and supplies for primary care, complete with customs documents) is available from MAP International (1-800-226-8550). It costs \$375, and is delivered within a few days. With 5 weeks' notice and for the cost of shipping, you can special order many medicines and other items from MAP, or the Catholic Medical Missions Board, or AmeriCares. Used medical equipment can be purchased from International Aid (616/846-0887). Many organizations sponsoring medical missions are religious in nature, but they often work with those who do not share their faith, as long as they are sure of your humanitarian intent.

Knowing the health needs of the region you will visit will help determine your medicine and supplies needs, but a lot of it is guesswork and intuition. Vitamins and iron tablets, protein powders, and Oral Rehydration Solution packets are universally applicable and always much appreciated. Antibiotics, skin creams, anti-fungal agents, cough and cold preparations, acetaminophen, antihypertensive drugs, antacids, anti-diarrheals, psychotropic medications, and non-steroidal anti-inflammatory drugs are universally useful. Be sure they're not outdated, or customs may confiscate them.

Once you have collected medicines, they need to be consolidated into minimal-space containers. Combine sample bottles, eliminate cotton plugs, and write the number of pills on each bottle. Place identical or similar medicines into transparent Ziploc bags, labeled with tape and magic marker according to brand name, generic name, or type of medicine, depending on your thought processes and on how much of each type of medicine you have available. Leave blister packs intact, but cut off excess cardboard. Keep the package inserts in the Ziploc bags.

Keep surgical equipment to a minimum unless you know you're headed for a high-trauma area. A few scalpels, syringes, lidocaine, diphenhydramine, epinephrine, gauze, tape, Betadine, sterile suture, and re-sterilized instruments from a



Figure 2. *Welcome to the Hotel California.* Missionary team members, with their truckload of medicine trunks, find a promising hotel in Posoltega, Nicaragua. L-R: George Timmons, Dada Bhaktapranananda, Kalyan, the author, Karen Engelke.



Figure 3. Children in a Haitian village run behind the truck to greet the returning medical team.

used, disposable suture tray are all you'll usually need. Flashlights or other light sources are essential; power is not always available, even in places that theoretically have electricity.

Ear curette, irrigation syringe, peroxide or a cerumenolytic, and magnifying eyeglasses (available for \$10-15) can be used nicely to remove impacted cerumen and foreign bodies.

11. You will need stationery for keeping records and on which to write patient instructions, and hundreds of envelopes and paper cups for dispensing medicines. Also, pens and magic markers. Have some of the formal stationery of your organization, for special documents. Cameras are a must, even the cheap disposables as long as they have flash. Video cameras are useful for filming groups at home, and for generating television shows when you get back. Make sure that the video operator has a steady hand or a tripod.

12. Toothbrushes, toothpaste, and dental floss are very valuable—for personal use as well as for distribution to people who may get no other dental care.

13. Eyeglasses can be fitted with minimal skill and training. You will need charts for near and far vision, used eyeglasses (brought with you), and a fluent speaker of the native language. Glasses can be obtained free from Lion's Clubs, local optometrists, and churches, and from MAP International. They may come pre-sorted, in which case you can set up a few samples with various diopters, and then let the patients choose from similar glasses in the stockpiles. If not pre-sorted, the patients will have to rummage through the pile themselves until they find something that helps. This traumatizes the glasses, and they break easily. It's best to limit patients to one or two pairs of glasses, and recheck their vision with glasses to make sure there's some improvement. Many people in primitive countries want them simply for ornamental reasons, but for those that need them, eyeglasses can be life-saving and life-enhancing.

14. Get immunizations; and maybe malaria prophylaxis. Donate blood before you take the pills, because you'll be ineligible for a year afterward. Check your local Health Department, and especially check the Centers for Disease Control travelers' website (www.CDC.gov) for advice on immunizations. Do this some weeks ahead, because some immunizations take time to put together.

Carry a squeeze bottle for water, Handi-Wipes, a personal supply of Cipro, suntan lotion, feminine pads, Imodium, Benadryl, Kwell, Tylenol, aspirin, and the usual toiletries. Especially carry mosquito repellent (DEET or perhaps Skin-so-Soft by Avon). Mosquito netting is useful, but must be suspended over your sleeping bag with sticks or strings, and may interfere with air circulation.

Call the US State Department (202/647-4000) or visit

their website at <http://travel.state.gov/travel-warnings.html> to check their travelers' advisories. There may be a revolution going on that you'll want to avoid. But whether there seems to be unrest or not, check with your local contacts by e-mail or phone, to make sure about the reality. Government stories often lag behind the truth. Make sure your passport is up to date, and take care of visa requirements in advance.

15. Call your airline and get permission to take on more than your allotted amount of baggage. Ask for the fee to be waived, too. You won't bring back most of your baggage, so they'll break even. The footlockers make wonderful presents for the locals.

16. Bring copies of your medical documents, including recent licensure registration. This may be important, although you won't need it often. Bring one or two of your personal prescription pads, and some business cards. A money belt is a good idea. Keep it with you at all times. Carry credit cards in two locations on your body; traveler's checks provide security, but may be difficult and expensive to cash.

17. Arrange customs documents with lists of each trunk's contents, preferably on organizational stationery. Have some vitamins and cold remedies available to give to the customs agents. Best of all is to contact embassies and local government officials at least a month in advance for clearance documents, including descriptions of where you'll be doing your work. You may have to provide an advance list of the medicines you're taking. Don't let local functionaries transport or distribute medicines and supplies for you—they may get re-sold. During emergencies like hurricanes and earthquakes, customs officials may bend the rules a bit, but this is not highly predictable and depends on the country. Giving away samples of vitamins and cold medicines may help smooth the customs process. If your medicines are impounded, get a receipt, lock the trunks, and plan how to get them back quickly, before the customs workers re-sell your stock. Consider bribery with cash. I'm told this works, but it has moral implications—and possibly disastrous legal implications if you are caught.

18. Buy travel tickets as far in advance as you can, because they are usually cheaper then. In case of climatic emergencies, airlines may give discounts or free tickets, but this takes a lot of maneuvering, faxing, and time, and is not always worth it for a busy doctor. But if money is very tight, it may be a worthwhile investment of time and effort.

19. Make sure your family and everyone at home is comfortable with your departure plans. Check your insurance. Get a phone card that you know will be valid on location (AT&T works well). Cell phones are nice, and work in some unexpected places.

20. Bring the usual diagnostic tools: otoscope, ophthalmoscope, tongue blades, flashlights, sphygmomanometers, thermometers, bathroom scales, tape measures, gloves and lubricant, guaiac cards and developers, urine dipsticks. Fingerstick glucose meters and hemoglobin meters sound good, but I've not yet used them. They do take time and require wearing gloves, so I use urine dipsticks to determine diabetes, and look for pale conjunctivae to diagnose anemia. A microscope would be handy, but I've never had one to use.

21. Get to know the locals right away. Support them financially—don't expect them to pay your way. Sing and dance, pray and meditate with them. Offer to help with their health needs, even before you go with them out to the fields.

Local contacts must arrange your sites of activity, although nightly joint planning and wrap-up sessions are a good idea. A school building or shack or front porch usually suffices for a mobile clinic. Sheets and drapes for privacy can be brought from home, or obtained locally.

When you get to your clinic site, sing some songs, get centered, and get to work. Stay out of direct wind and sun when possible. Distribute tickets with numbers, so people will not have to wait in line forever. Estimate how many patients you can see, and then give out slightly fewer tickets. I often see to 60 to 70 people in a day, doing problem-oriented primary care. This is hard work.

Keep records, including name and address (or at least neighborhood) so you can get someone back for follow-up if needed. Keep the records in one folder per neighborhood per day. Open up your trunks in a semicircle for easy access, and set up tables in front. Put the Ziploc bags in category order ("Stomach," "Heart and BP," etc) or alphabetical order, with commonly used medicines and vitamins by your side at the desk. Fill envelopes yourself, or have your "pharmacy technician" do it. Write instructions in the local language directly on the envelope. Paper cups may be used to dispense liquids. Paper prescriptions don't work well because most people don't have the money to buy the drugs, and many have no transportation to a pharmacy. If you do write a prescription, ask the locals, especially professionals if available, how to word it in the local language. *Every patient* you see should receive some type of dispensed medicine, even if it's only TUMS (which in Haiti is often quite useful) or Tylenol or vitamins. The patients have waited for hours and need something to show that you love them. They often expect a remedy for each of their complaints, and you may be able to do this, even if the quantity of dispensed medicine is quite small.

22. You will need someone to take vital signs (at least blood pressure) and weigh and measure heights of babies, and a pharmacist. When possible, have someone identify the guardians responsible for children. In addition to looking for discolored hair, big bellies, etc, use locally generated height-

weight charts to detect malnutrition (US kids are often bigger than third-world kids).

Set up the eyeglass clinic in a separate, well-lit area. One or two people can fit 20-50 pairs of eyeglasses in a day. A newspaper can be used to determine near vision, if charts are unavailable.

Make sure you take lunch breaks. Don't work too much after dark. Mosquitoes attack then, and your mental accuracy is less. Remember, you need to rest for the next day. Ending the clinic session is often difficult, because other patients clamor to be seen. Do what you can to be firm and gentle as you leave. Often a few vitamins or Tylenol will assuage hurt feelings. Better to arrange your numbers in advance.

It is helpful to have someone with spiritual or psychological training available to help with emotional problems (yours as well as the patients'). When you get frazzled—and you will—take time out, walk away from it all, admire the jungle scenery or the sandy bedrock of the refugee camp, go to the latrine (or make one), eat something, sing. Then get back to work, but only when you're calm and centered again. Have someone take pictures and run the video camera. Pictures are great for newspapers back home and are easy to show to friends and at medical gatherings. Videos can be edited for news media back home. Pose some of the shots. Candid shots are nice, but posed ones, based on candid events, often give the best appearance in a newspaper article. Use flash liberally.

23. Food will be provided by the local inhabitants, who will also provide guidance as to the site of the clinic. Boil or filter your water, but even better, let only bottled water touch your mouth or eyes. Carry a squeeze bottle of water at all times for drinking and washing. Also carry toilet paper. Have surgical masks available for interviewing known TB patients or those who smell bad.

Keep casual prescribing and dispensing of medicines to a minimum except when you're actually operating the clinic. It's both difficult and time-consuming, because your records and your medicines and supplies are all locked away in various footlockers.

24. Arrange to have chairs and tables. Two closed trunks can double for an exam table. Usually locals can provide the furniture.

25. When you eat lunch, arrange to have food for the crowds waiting. This will depend on the poverty level of the community and your own capacity, both in terms of personnel and food resources. Often you can make the clinic a joint venture with a food distribution endeavor.

26. Keep a clean towel handy and a basin of clean water with a few capfuls of bleach in it. Wash your hands frequently, and also use it to disinfect some of your instruments.

Replace the bleach water every few hours. Betadine can be used to resterilize instruments. Disposable instruments are best; you can resterilize disposable instruments obtained from your own office or a local emergency room. Wash your clothes every day or two with a bucket and soap, or have someone do it for you.

27. Practice good medicine. Remember: *First, do no harm*. Realize that there is only a limited amount you can do for any individual. Your mere presence is a major step in the right direction, both for you and for your patients. Problems that you can't handle can be referred to a local hospital. If there is no local hospital—well, when you can't handle it, you just can't handle it. Better to admit it and not try. There are other patients waiting for whom you can do some good, and there's nobody for whom you can't provide some type of palliative care. Spiritual care is far better than none.

Scabies is common. Elimate is expensive, and so lindane is more likely to be available. On babies, I usually recommend only four hours of treatment, to avoid neurologic sequelae.

When you've seen the last patient of your trip, arrange for unused medicines to be used properly by local hospitals and practitioners. Get a receipt, making sure that the medicines will not be sold for profit. Take the receipt back home—your donors will need it. Give follow-up instructions to the locals that you're leaving behind.

28. Keep your team happy, well-fed, well prayed-for or meditated-with, and filled with song. Avoid snappiness. The job is always more than you can handle, so get used to it and have a good time. Rest when you're weary; eat when you're hungry; sing and meditate when you're frustrated. Our work is just a drop in the bucket, but it is a real drop, and much appreciated by all.

29. Keep a diary, even a brief one. Tally up how many people were benefited. A list of diagnoses (see Appendix) will help others going to the same area, and may be useful to local public health officials. An emotional diary will help you process the experiences as you go. Maintain your own physical, emotional, and spiritual health; without it, you can't continue your mission. You must keep up your usual sleep, exercise, dietary, and spiritual practices to stay in top shape.

Remember, you are the primary instrument for carrying out the good work being done. You must stay as sharp as you can. All participants should call their spouses in the middle of the trip; send flowers or have a pizza delivered to let them know you're thinking of them. A little tourism is permissible, so get some souvenirs to take home.

30. When you get home, kiss your spouse and kids; unwind a bit; tell a few stories; wash up; get some rest. Apply Kwell or Elimate and shower eight hours later to remove the scabies that have hitchhiked home with you.

After a week at home, when things calm down, get your film developed. Make duplicates (and extra copies of the good shots). Write up your experiences and submit them to the local papers, radio and TV stations, and medical journals. Label the pictures on the back.



Figure 4. A Haitian patient with electrocution burns. The burns have been self-treated using a paste made from ground *gueri-tout* ("heal-all") root. No infection was seen.

True story: When I got back from Jamaica after Hurricane Gilbert, I sent a report to AMURT Headquarters in India. My guru's only response was, "Where are the clippings?" So I called the local papers, surprised that I was ordered to seek fame for a supposedly selfless act. As it turned out, I became a hero of sorts, and these "clippings" inspired people to contribute to good works at home, join me on future trips, and be uplifted because someone from the community was working to hold the world together in a bond of friendship and love. So now I write up my experiences and send the articles and photos to local papers, TV stations, and all major donors; to everyone who shared in the adventure. You please do the same. Have a great time!

Acknowledgments. This article is based on experience obtained through many trips over a number of years. The data in the Appendix were derived from a March 2000 mission to Venezuela by an AMURT team comprising the author; Robert Eklund, MD, from Tennessee; Joyce O'Briant, LPN, from Cleveland Community in Johnston County, NC; Abigail Greiner; and Aaron Green. The author wishes to thank his excellent team, especially Abigail and Aaron, both third-year medical students at UNC-Chapel Hill, who collated the data and did the computer work, and who contributed materially to the success of the mission. Photographs are courtesy of the author.



Figure 5. Patients gather in an improvised outdoor waiting room at a Haitian medical camp.

Some thoughts on Dr. Steven Landau's "Do It Yourself Medical Mission"

Dr. Landau presents a fascinating perspective on the short-term medical mission. Not only does he provide the novice with useful facts, he highlights the difficulties and the joys inherent in this type of work. Dr. Landau's entire focus is *to serve my patients*. His article is timely; the American medical profession, I feel, has been slowly spinning in the opposite direction: *to serve ourselves*.

One evening two years ago, Dr. James O. Armitage, the Dean of the University of Nebraska College of Medicine, asked me how "we" had managed to create a system in America that trained the greediest doctors. Stunned, I attempted to disagree. But over the past two years this comment has haunted me, and I now confess I find a kernel of truth in it. To be sure, all American society is greedy: lawyers, businessmen, Wall Street investors all earn more than doctors do. But one of their prime charges is to earn money; ours is to serve.

How can we bring perspective back to our profession? I believe that the first step is to recognize and honor the many doctors who believe in and practice

their calling with dedication and humility. Secondly, training programs should emphasize the central core of our mission; they should not just talk about service, but demand it from faculty, students, and house staff. Thirdly, the organizations that govern training and practice must rededicate themselves to the fundamentals of medical care rather than spending their time and our money maintaining the status quo.

Dr. Steven Landau has matched himself to this ideal in the simplest way possible. He encourages others to do the same. Obviously not everyone will have the opportunity to do just what Dr. Landau has done. Some can work in their communities, others have the talent to care for the acutely ill in hospitals throughout the world. We all have talents that we can donate. It is time that we started doing so.

—G. Ralph Corey, MD, Professor of Medicine
and Director, Internal Medicine Residency
Training Program, Duke University Medical Center

Appendix: Tally of patient diagnoses in five villages of Barlo-Vento, State of Miranda, Venezuela, three months after the winter flood of 1999-2000*

Diagnosis/Problem	Village					Total
	Guajarita	El Tesoro	El Campo Alegre	Perdomito	Las Lapas	
Upper Respiratory Infection	25	11	18	28	7	84
Scabies	5	20	1	10	3	39
Headache	8	11	5	10	4	38
Asthma/Bronchitis	10	6	9	6	7	38
Joint Pain/Arthritis	9	9	4	5	7	34
Well Adult/Vitamins		15	5	5		25
Superficial Fungus Infection	3	1	11	7	2	24
Anemia	9	6	4	3	1	23
Parasites	7	5	7	3		23
Otitis Media/Ruptured Membrane	7	6	1	3	4	21
Bullous Impetigo	1	10	4	1		16
Poorly Healing/Infected Wound	5	6	2	3		16
Diarrhea/Gastroenteritis	6	6		3	1	16
Dermatitis/Eczema /Other Skin	2	2		5	2	16
Vision Problems/Cataracts	5	3	2	3	1	14
Myalgias	1	6	1	3	2	13
Well Child	4			3	5	12
Impacted Cerumen	2	3	1	4	1	11
Abdominal Pain	1	1	3	4	2	11
Depression	1	4	1	3		9
Esophageal Reflux/Gastritis	3	1		3		7
Malnutrition	3	1	1		1	6
Dental Problems	1		1	4		6
Conjunctivitis			1	4	1	6
Allergies		1	2	2		5
Sinusitis		1	1	3		5
Cardiovascular Problem				3	2	5
Pneumonia	2			2		4
Obstructive Lung Disease				2	2	4
Vertigo/Dizziness	2	1	1			4
Lumbar Strain	1	1	1	1		4
Bug Bites	2	2				4
Urinary Infection			3	1		4
Insomnia		2	1		1	4
Dysmenorrhea/Vaginitis/Pelvic Pain	2			1	1	4
Acne	2		1			3
Obesity	1	2				3
Constipation	2			1		3
Pregnancy	2			1		3
Carpal Tunnel Syndrome	1			1	1	3
Tonsillitis		1	1	1		3
Viral Syndrome		3				3

Plus two cases each of weight loss, diaper rash, weakness, orthostatic hypotension, allergic rhinitis, Erb's palsy, stroke, anxiety, atherosclerotic heart disease, and single cases of tobacco abuse, heat rash, ankle sprain, lymphadenopathy, congenital bone deformity, otitis externa, edema, learning disability, burns, diabetes, ligamentous laxity, hearing loss, kidney stone, herpes lesion, dyspareunia, hypermenorrhea, hyperthyroidism, family planning, foreign body in ear, deafness (child), polyuria, callus, alcoholism, pinguecula, chiggers, hyperemesis gravidarum, laceration.

*Compiled by UNC-Chapel Hill medical students Aaron Green and Abigail Greiner.



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Carolina Physician's Bookshelf

Edward C. Halperin, MD, Book Review Editor

Chang and Eng

by Darin Strauss

New York: The Penguin Group, 2000. 323 pp.

Reviewed by Eben Alexander, Jr., M.D.

This book about the original "Siamese Twins"—Eng and Chang Bunker—is, in fact, advertised as a novel. In the sense that it deviates from the true facts about the twins, it is a "novel." Many facts, such as names of individuals other than the immediate family, were changed, and the twins and their wives and children lived in Mount Airy, not Trap Hill, North Carolina. Having myself lived in this section of North Carolina, having known a number of the Bunker descendants, and in fact having been to some of the reunions of the descendants in White Plains, North Carolina, I can appreciate the feeling of those descendants about this book.

The book consists of a prologue, an epilogue, and thirteen chapters. The entire text is a series of "vignettes," written without chronological order. From the first chapter, which covers the year 1842 when the twins were 30 years old and living in North Wilkesboro, NC, the reader is taken in the second chapter to their birth on a riverboat on the Mekong River just south of Bangkok, Thailand (their father was Chinese and their mother was one quarter Thai). In Chapter 3, the reader is dealing once again with the twins at age 30, again in North Wilkesboro where they meet two sisters of the Yates family. In Chapter 4, we are back in Siam with King Rama III, who, according to the tradition of that period, should have killed the conjoined twins since the birth of "monsters" was thought to bring bad luck to the nation because of the displeasure of the "Divinity." So goes the entire book, from Siam to North Carolina, to the long sea voyage with Captain Hunter on the *Sachem*, to New York, to Boston, Philadelphia, Europe, London, back to North Wilkesboro. There is no temporal, geographical, or emotional train of thought.

One must admire the author's efforts to understand and relay the language, customs, and biases of the people of North Carolina just before the Civil War. There is a significant and perceptive reference to slavery since, as a result of their exhibition all over the world, Chang and Eng were wealthy by local standards and owned several slaves. It is

important, likewise, to acknowledge the research and study the author must have done to learn the customs of the King and his retinue in Thailand. This is extensively described, including a vivid portrayal of the widespread cruelty and disdain of individual rights.

The "Siamese Twins" did marry the two Yates sisters, Sarah and Adelaide, and did father 21 children between them, so there has always been a good deal of curiosity and prurient speculation about their sexual relations. The author speculates about this, too, and deals with the matter over a considerable portion of the last few chapters. The author fantasizes a love of Eng for Chang's wife, several years into their dual marriage. Of course, the wives slept in the same bed with the attached twins. This is a part of the book about which some of the Bunker descendants are offended.

Darin Strauss is obviously an educated and cultured man who writes the book as if Eng were speaking. He seeks to look at and describe the great difficulty of the twins in being inexorably attached to one another. He covers this problem well.

Eng was the more educated and was said to read Shakespeare in his leisure moments, but the Twins were not educated in schools, and did not learn to speak English during their long sea voyage to America. It seems unlikely that Eng would say, "Union soldiers, escaping from Confederate prisons like the one in Salisbury, oft wound up in Wilkesboro, and whatsoever runaway Yankees who did not skulk in the dark of night toward the federal lines in Tennessee lingered to loot our town." That kind of language would not be real for Eng, Chang, Sarah, or Adelaide, but the description of what went on in northwest North Carolina during the Civil War is well described.

The book did not really appeal to me, in part because I had read the much superior book, *The Two*¹, published by Irving and Amy Wallace in 1978. The Wallace book is a well-researched, detailed account that quotes newspapers of the era and many documented letters pertaining to the twins. Readers of *Chang and Eng* should refer to *The Two* for factual information.

¹Wallace I, Wallace A. *The Two*. New York: Simon and Shuster, 1978.

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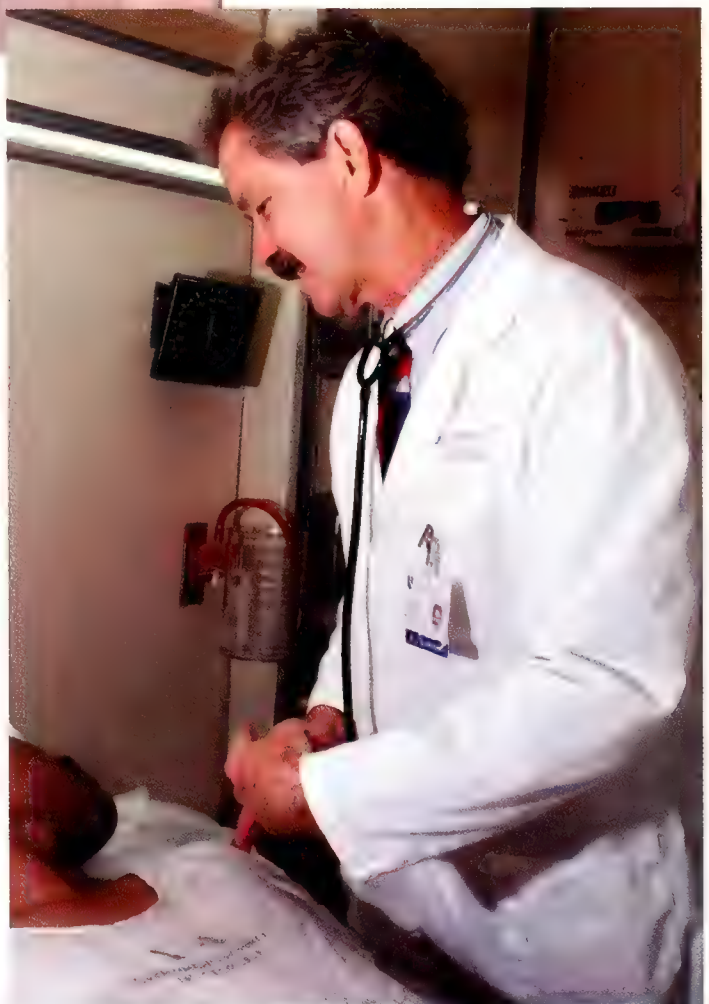


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Paul A. Buescher, PhD, Editor

Declining Teen Birth Rates in North Carolina and the United States, 1991-1998

Between 1991 and 1998, birth rates for women aged 15-19 declined nationally for all race and ethnic populations. The 1998 US birth rate (51.1 live births/1,000 women aged 15-19) got close to the low of 50.2 recorded in 1986. Between 1991 to 1998, birth rates for women aged 15-19 fell significantly (by 10%-38%, depending on the state). Rates of abortion and pregnancy for teenagers also declined through 1996, the most recent year for which rates can be computed nationally.

Teen birth rates declined in North Carolina between 1991 and 1998, but still remain higher than the US average. For North Carolina women aged 15-19, the birth rate declined by 13.5% (from 70.5 to 61.0), but 38 states had higher rates of decline than North Carolina.

When rates are compared by age, the largest decline in North Carolina and in the US was among women aged 15-17 (21.6% and 21.4%, respectively). Among women aged 18-19, the rate of decline in North Carolina was much lower than that for the nation (3.1% compared to 13.1%). The following table shows North Carolina teen birth rates by age for 1991 and 1998.

North Carolina Teen-Age Birth Rates*

Year	Age 15-19	Age 15-17	Age 18-19
1991	70.5	46.2	101.7
1998	61.0	36.2	98.5
Decline, 1991-98	13.5%	21.6%	3.1%

*Live births/1,000 population in the age group

The sharpest declines in North Carolina and in the US were among black teenagers (23.6% and 26.1% respectively). Nationally, the rate for black women aged 15-19 reached an all-time low of 85.4 in 1998; the rate in North Carolina (84.7) was very close to that.

Several factors associated with teen sexual activity probably lie behind the decline in teen birth, pregnancy, and abortion rates. These factors include changed attitudes toward premarital sex, a leveling off of teenage sexual activity, greater use of condoms, and the use of effective injectable and implantable contraceptives by sexually active teens.¹ In addition, the better employment, economic, and educational opportunities available to teenagers during the economic expansion of the 1990s likely influenced decisions about sexual activity and childbearing.

We welcome the decline in teen birth rates, but a few words of cautions are needed. The rate at which North Carolina teenagers give birth remains high compared to the nation, and the rate of decline in North Carolina lags behind that of most other states. And despite substantial declines since 1991, the birth rate for black teens in North Carolina is 75% higher than that for white teens.

Furthermore, there are still serious health consequences for teen mothers and their children. Pregnant teens are less likely than older women to receive timely prenatal care or to gain an appropriate amount of weight during

[continued on next page]

Running the Numbers, cont'd.

pregnancy. Pregnant teens are more likely to smoke cigarettes during pregnancy; in fact, the percentage of pregnant teens who smoke has increased since 1994.¹ As a result of these and other factors, infants born to teenagers are at greater risk of low birth weight, preterm birth, and death within the first year of life.

Finally, the United States has a high rate of teen birth compared to other countries. According to the United Nations Population Fund, the US teen birth rate in 1996 was higher than the average for all of Northern Africa and Western Asia and several times higher than the rate in Western Europe.² Abortion does not account for the lower birth rate in other Western countries; in fact, the abortion rate for women under age 18 is more than twice as high in the United States. Better contraceptive

services for teens in other countries are the main reason for these differences.³

¹Ventura SJ, Curtin SC, Matthews TJ. Variations in teenage birth rates, 1991-98: national and state trends. *National Vital Statistics Reports*, vol. 48, no. 6. Hyattsville, MD: National Center for Health Statistics, 2000.

²United Nations Population Fund. *The state of world population 2000: lives together, worlds apart*. New York, September 2000..

³Jones EF, Forrest JD, Goldman N, et al. Teenage pregnancy in developed countries: determinants and policy implications. *Family Planning Perspectives* 1985; 17:53-63.

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*From the Center for Health Informatics and Statistics
www.schs.state.nc.us/SCHS*

North Carolina Department of Health and Human Services



WISH KID EVAN, AGE 6

This is the day we discovered the ocean.

And I learned jellyfish aren't made of jelly.
And my brother laughed so hard he swallowed the sea.

This is the day we all got to forget I was sick.

MAKE-A-WISH.

If you know a child with a life-threatening illness, please call 1-800-722-WISH.
And share the power of a wishSM.

www.wish.org

Mad Dogs, Microbes, and Other Pests

Some Medical Problems in Early Durham

Jean B. Anderson

The medical history of early Durham is a resource of varied riches. Let's sample a few: the first doctor, the public health battle, a trio of diseases, and a bit of folklore.

Imagine if you can, instead of the city of Durham as it exists today, a landscape that contained nothing but open farmland interspersed with woods and a crossroads hamlet. One road ran from Roxboro to Fayetteville, the other, from Raleigh to Hillsborough. Near the cluster of buildings stood a farmstead belonging to Dr. Bartlett Leonidas Durham. That was the scene in 1850.

The newly chartered North Carolina Railroad was looking for a place to build a station near this village. William Pratt, the owner of the store at the nucleus of the village, refused to have a station on his land. Pratt's neighbor, Bartlett Durham, was glad to give the railroad more than three acres of his land. He knew it would bring growth of population and commerce. The station, warehouse, and water tower were soon built on the donated land and called Durham's Station.

Dr. Durham

It seems eminently fitting that the City of Medicine should have been named for a doctor. Bartlett Durham was born in southern Orange County in 1824. We know nothing about his education. He probably learned his profession as an

apprentice to a local doctor, perhaps James Webb of Hillsborough. That was still the common method by which one became a doctor. Bartlett Durham has been described as a tall, portly man (he weighed over 200 pounds), who, on "moonshiny nights," would gather a group of boys together and serenade the town. His alcoholic binges were excused as being the result of temporary depressions caused by the deaths of patients. Oral tradition says that his house was called Pandora's box. In classical legend, you remember, when Pandora opened her box, all the ills of the world flew out. I puzzled about the name until I reread the legend and discovered that one thing remained in the box: Hope. Certainly hope was the one remedy a doctor could give his patient in that time and place.

In 1859, Bartlett Durham died of pneumonia at the age of 34. He subsequently reappeared in Durham in 1933 when some businessmen decided he should be buried in the town named after him, with a suitable monument to mark his grave. From a country churchyard they dug up his iron coffin with a glass cover under the iron lid. When they opened the lid they found his body still intact, with spectacles on his nose. The body was displayed at the Hall-Wynne Funeral parlor, and hundreds of curious Durhamites viewed it before reburial in Maplewood Cemetery. The large monument then raised over his grave has three errors on it: his birth date, death date, and middle name. So much for good intentions.



Dr. Bartlett L. Durham

By permission of Duke University Special Collections Library. Reprinted in Anderson JB, Durham County. (Durham, NC: Duke University Press, 1990).

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The Start of Public Health

The Civil War put further growth of the village on hold. At the war's end fewer than 100 people lived in Durham's Station, but by 1880 the number had grown to 2,100, and it increased every year thereafter. Tobacco manufacturing, which began near the station in Durham just before the Civil War, fueled the phenomenal growth. By the mid-1880s Durham was "a roaring old town." But for all its growth it still lacked a water supply or sewer system. There were privies in all the backyards, manure fouled the muddy streets, garbage littered the sidewalks, and pig pens and chicken coops added their share to the general filth. A town doctor, Isaac Manning, remembered that, in those days, "Durham smelled to high heaven." As you might expect, typhoid fever, malaria, and other infectious ailments were common.

When the town had been chartered in 1869, the aldermen were authorized to establish a board of health and to enact and enforce public health laws. In 1872 the aldermen appointed two men, one a doctor, as a board of health. The board recommended an ordinance requiring the regular cleaning of privies, the clearing of trash and refuse from the town, the draining of stagnant pools, and digging of ditches to prevent other pools from forming. The aldermen enacted these reasonable measures, but were met by such an outcry of opposition that they immediately backed down and did not enforce their own regulations. The same scenario was played out again and again over the next 40 years. The aldermen appointed one board of health after another but never enforced the regulations they passed.

The cherished individualism that served a pioneer, rural population well was detrimental to urban life and obstructed the government. It takes education and time to make people understand that the public weal must outweigh private rights if a society is to progress. Remember the fight to get fluoride into city water? And how carefully the state phased in the law about seatbelts? Nothing better exemplifies the tension between public regulation and private resistance than the battle over smallpox vaccination. Richard Bennehan at Stagville had his family and slaves inoculated by 1802, but Durhamites were still refusing to be vaccinated a century later. During a smallpox epidemic in Durham in 1901, a Trinity College faculty wife wrote her son, "Small pox does not get any better. They have forty-three in the pest house. A few days ago a negro woman who worked at the Bull factory took the disease and that family were taken to another place. The daily papers are quiet on the subject." At least quarantine of cases was being enforced.

In 1909 another outbreak of smallpox led to a law requiring that everybody be vaccinated. A large delegation of angry citizens appeared before the board of health and protested that it "would work great hardship upon the women and children and the aged whose constitutions would not be able to bear the strain of vaccination." At first the board

compromised by ruling that small children, the aged, and those in poor health who stayed habitually indoors would be excused. Even that didn't satisfy the protesters. In the end the board caved in again and made vaccination *voluntary*! So the epidemic continued until the state stepped in and formed a board of health for the city and, a couple of years later, another board of health for the county.

In 1913 the two boards were combined for the sake of efficiency. This was the beginning of the Health Department we know today. A doctor headed the five-man board, which hired another doctor as director of health. The director was given a staff of nurses, inspectors, and sanitary police to serve the public and enforce health regulations. Two excellent doctors in succession ran the department during its first 45 years: Dr. Arch Cheatham and Dr. J. H. Epperson. Under their aegis it became one of the most progressive, effective, and respected departments in the state.

But things had already begun to improve as early as 1907, when the city passed the law requiring the registration of births and deaths, beginning in 1908. The state did not pass such a law until 1913, five years later. Lest we congratulate ourselves too soon on such foresightedness, remember that in 1859 Dr. Thomas Cameron of Fayetteville introduced a bill in the state legislature to require the registration of births and deaths. Needless to say it failed.

A key result of the state law of 1913 was the new health department's annual report listing complete statistics on births, deaths, and incidence of disease. For the first time doctors, civil authorities, and citizens knew the scope of the problems they faced. The report revealed the glaring disparity between white and black morbidity and mortality. In almost every category, rates for the black population were double, even triple, those for the white. If typhoid, tuberculosis, and pneumonia were particularly bad, infant mortality was shocking. In 1915 more than 18 out of every 100 black babies died before their first birthdays, a figure not including stillbirths. As late as 1927, one in 12 black babies was born dead, while the figure for whites was one in 30. Life expectancy for black men was 32 years and 35 for black women; whites of both sexes could expect to live 20 years longer. Over the ensuing years, the board of health addressed these problems by training and licensing midwives, by distributing pasteurized milk to babies, by giving typhoid shots, by sending nurses into the poorest communities to educate families about sanitation and food preparation, by passing ordinances for the general handling of food and drink, by regulating places where food and drink were sold, and by – at last – outlawing pigs and chickens within the city limits.

Tuberculosis, Scourge of Durham

Another revelation of the annual report was the high incidence of tuberculosis in Durham. This was not entirely

surprising since TB was, of course, the leading cause of death in 19th-century America. The report showed the usual racial pattern: morbidity and mortality rates were two to three times higher for blacks than for whites (in 1910 tuberculosis accounted for 20% of black deaths). Although Robert Koch had identified the bacillus that causes tuberculosis in 1882, no cure was then in sight. As urbanization increased so did the number of cases until the epidemic could no longer be ignored. In 1911 the North Carolina death rate for TB was more than 50% higher than the national rate. In 1922 the Durham rate was the highest in the state, and the state rate was still much higher than the national rate. As late as 1926 tuberculosis still headed the list of causes of death in the city of Durham.

The health department instituted measures to fight the disease. It began testing cattle for tuberculosis, and destroyed those with the disease in order to protect the milk supply. A nurse was sent into poor neighborhoods to try to identify new cases early, and to advise and monitor them. Regulations were passed concerning the disposal or sterilization of eating utensils in restaurants and other public facilities. Since TB was a contagious disease, isolation of patients was vital to stopping its spread. But Watts Hospital in Durham had no isolation ward. In 1916 Lincoln Hospital in the black community added a tuberculosis wing.

In the 1880s, fresh air – particularly the air of pine forests – along with rest and good food, was thought to be beneficial as a treatment. Saranac Lake, NY, and Asheville, NC, became popular retreats for TB patients. Unfortunately, few Durhamites were wealthy enough to afford that remedy; so the Health Department, keeping the basic principles in mind, helped implement two programs aimed at preventing tuberculosis in children. Because underweight youngsters were thought to be at high risk for developing the disease, in 1924 Morehead School set up what it called the Open Air Class for primary school children. There the children were taught in a classroom whose windows were always open, and were given naps and healthy snacks and a nutritious lunch. Their weight was carefully charted. Taking this idea a step further, in 1930 the Woman's Club of Durham set up a summer camp at the old Guess-Bowling mill on Guess Road. Volunteers renovated the existing buildings to accommodate 30 boys and girls who were supervised by a director

and a number of assistants. The children were given lots of good food, rest, taken to swim in the river, and provided with other diversions. The program was discontinued after nine summers because the Eno River became too polluted for swimming.

For years one civic organization after another attempted in vain to get the county to build a TB hospital. The county held referenda in both 1923 and 1927; each time the measure was defeated. Finally, in 1944, a majority of the citizens voted for a hospital, and the old prison administration building on Broad Street was rehabilitated as a sanitarium. Four years later the discovery of streptomycin made the hospital obsolete.



The old Durham County Jail, which was converted to a tuberculosis hospital around 1944. Photo from Roberts CP, et al. *Durham Architectural and Historic Inventory* (Durham, NC: Historic Preservation Society of Durham, 1982).

Pellagra

A disease new to Durham – pellagra – appeared in 1906, and it grew to epidemic proportions by 1911. Speculation variously blamed the disorder on spoiled cornmeal, the bite of the sandfly, organisms in the blood, and the like. Some doctors thought it was contagious because often more than one member of a family had it. When it became apparent that

the disease was linked to poverty, doctors would spare the families' feelings by falsifying the cause of death on a death certificate. Pauli Murray, the first black woman to be ordained in the Episcopal church, grew up in Durham. She related that "Down our way having pellagra was only a little less disgraceful than having 'the bad disease,' as folks called gonorrhea and syphilis." In 1912 the US Public Health Service determined that pellagra was caused by a nutritional deficiency, and recommended a diet of red meat, fresh fruits and vegetables, and dairy products. A black doctor in Chapel Hill, Edward Caldwell, had already hit on this solution himself. Murray related, "the white folks sat up and took notice. Before long they were sending for [Dr. Caldwell] to come to their places – after dark."

In hindsight, it is easy to understand why this disease flared up in Durham and throughout the industrial South. As industry increased, particularly cotton mills, more and more rural families left the farm and moved to towns where parents and children could find work in the cotton mills and other industries. In Durham, mill workers worked wretchedly long hours, six days a week, and had no time or energy to turn their

small yards into gardens. Consequently their diet, completely adequate when they lived on farms and grew their own food, became one of mostly pork and cornbread after the move to town. They bought what they ate and couldn't afford anything else. In addition, new roller-mills removed a nutritious part of the grain they ground, thus adding to the problem. Over time, dietary deficiencies became outright disease and the number of cases increased as more and more of the new town dwellers failed to get the nutrients they needed.

The exact deficiency in the diet that caused pellagra was not known until the 1930s when niacin (nicotinic acid) was identified as the missing ingredient. Long before that doctors had found that a diet high in liver, yeast, and whole grains could cure the disease. But trying to get people to change to a diet they could hardly afford was almost impossible. Therefore, pellagra was mentioned in the annual reports of the Board of Health for many more years.

Mad Dogs and Madstones

Now a little folklore to finish. Rabies is a disease still very much a threat today. Fortunately, thanks to Pasteur's work, we have vaccinations to prevent it, but still no remedy to cure it. The early Durhamites used madstones. A madstone can be of vegetable, animal, or mineral origin, depending on the culture and the geography. Madstones were used to treat snake and spider bites as well as animal bites. This folk remedy has existed since time immemorial. Native Americans used the bezoars they found in the stomachs of ruminant animals; in other parts of the world opalescent growths on bamboo shoots were used. In British tradition actual stones were used, which is why real stones were used in Durham.

The stones had a porous composition that was thought to absorb poison. This is how it worked: the madstone was applied to a wound and would adhere as long as it was "absorbing poisons"; when it became "full," it would fall off. The stone would be then cleaned in water and reapplied until it would no longer adhere.

Madstones became treasured heirlooms and were passed down from generation to generation. The Rev. Alexander Walker, a Methodist circuit rider and manager of the Bull factory in Durham, owned such a stone. Each time a person in Durham was bitten by a stray dog, the stone was sent for and applied to the wound. Newspapers faithfully reported all these applications (and the usually happy outcome). This sorry state of affairs was still going on as late as 1912, but the tradition was dying. A child bitten in 1900 died despite having used a madstone. By 1909 the newspaper was ridiculing the practice and reported, instead, a case where the dog was killed, its head taken to Raleigh for examination, and the victims given rabies shots.

A Final Word

Let me close with a quotation from Sir William Osler. In 1902, in summing up the 19th century just past, he set down words that could as well be written today, a 100 years later, about the 20th century: "The average sum of human suffering has been reduced in a way to make the angels rejoice. Diseases familiar to our fathers and grandfathers have disappeared, the death rate from others is falling to the vanishing point, and public health measures have lessened the sorrows and brightened the lives of millions."

How many journals do you know that began as long ago as 1848 to serve as the document of the medical history and developments and attitudes of a single region and population?

Read page 118.

The North Carolina Medical Journal

Emergency Contraception

Attitudes and Practices of Primary Care Doctors in North Carolina

Julie Nielsen Lindsey, MSIV

Half of all pregnancies in the United States are unintended.¹ Furthermore, one of every eight girls aged 15-19 becomes pregnant every year.² As a result, the United States has the highest teenage birth rate in the developed world, four times that of the European Union.³ The US abortion rate of one in four pregnancies is the highest in the developed Western world.⁴

Emergency contraception has gained recent public attention as a potentially effective but highly underused way to prevent pregnancy. The Office of Population Research estimates that emergency contraception could prevent 1.7 million unintended pregnancies and 800,000 abortions every year.⁵ However, only 1% of women in the United States have used emergency contraception.⁶ It has been called "the best kept secret in medicine."⁷

Emergency contraception (the "morning-after pill") is used after sexual intercourse to prevent pregnancy. The currently recommended form of emergency contraception (the "Plan B" regimen) calls for two, high-dose, progesterone-only oral contraceptive pills, the first dose taken within 72 hours of unprotected intercourse and the second dose 12 hours later. It works by inhibiting ovulation, and possibly by interfering with fertilization and implantation,⁸ mechanisms that differ distinctly from the newly approved early abortifacient drug, RU 486. Other effective emergency contraceptive techniques include the "Yuzpe method," which uses two high doses of combined oral contraceptive pills, and post-coital insertion of an intrauterine contraceptive device (IUD).

Emergency Contraceptive Pills (ECPs) have been widely used in Europe since the 1970s. In the US, ECPs are most often prescribed in emergency departments for treatment of rape victims and in university health centers.⁹ Initially, ECPs

were offered as an off-label use of oral contraceptive pills, but in February 1997, the FDA issued specific recommendations about ECPs in advance of an application for bringing such a product to market⁹. In 1998, a company called Gynetics marketed an emergency contraceptive kit called *Preven*, which contains appropriately-dosed combined estrogen and progesterone pills, instructions, and pregnancy test materials. A pilot program in the state of Washington now allows pharmacists to directly dispense ECPs without a physician's prescription.

The use of emergency contraception is clearly in a transitional stage. As a result of recent media coverage of emergency contraception and a telephone hotline, increasing numbers of patients are requesting ECPs from their doctors.¹⁰ Health departments in North Carolina are required to offer ECPs as a condition for receiving federal Title X Family Planning funds. Many health departments now offer ECPs, and the state is beginning to monitor for compliance with the requirement.

Primary care doctors are in an ideal position to offer first-line pregnancy prevention services to women across the range of reproductive ages, but emergency contraception is not commonly offered in family practices. A 1997 Kaiser Family Foundation survey found that less than 40% of family doctors inform patients about the availability of emergency contraception.¹¹ According to the Kaiser study, widespread lack of information on the part of both the public and medical profession is an important reason for the under-utilization of emergency contraception. These considerations led me to ask North Carolina family physicians about their current practices of and their views about emergency contraception as a way to reduce unintended pregnancies and abortions.

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Table 1. Number of times per year physicians offered ECPs

0 times	45 %
1-4 times	49 %
5-10 times	4 %
>10 times	2 %

Table 2. Physician support for offering ECPs on request at an office visit

	Not supportive	Neutral	Supportive
Men	25%	10%	62%
Women	11%	7%	80%
Total	21%	9%	70%

Methods

Subjects: A 38-item questionnaire was included in the registration materials given to the 354 doctors who attended the 4-day Annual Meeting of the North Carolina Academy of Family Practice in December, 1998. Completed questionnaires were collected in a drop box at the registration desk. To supplement misplaced or forgotten questionnaires, additional forms were handed to conference participants as they entered and exited from meetings. A total of 138 completed surveys were collected—a response rate of 39%. Questionnaires complete by students and non-physician medical professionals were excluded.

Questionnaire: The questionnaire was pilot-tested in a small community in eastern North Carolina. Following an introductory paragraph containing background information on emergency contraception, the form posed questions about current practice patterns. Respondents used a four-point scale to indicate how many times per year they offered emergency contraception. Other questions asked how respondents informed patients about ECPs in their practices, and how they viewed emergency contraception. Respondents were asked to indicate, using a scale of 1 to 5, their degree of support for various approaches to ECPs (do they mention ECPs during routine contraceptive counseling; do they offer ECPs upon request at an office visit; do they prescribe ECPs by telephone to established patients; do they prescribe ECPs by telephone to new patients; do they offer ECPs in advance of need). A section of the survey asked respondents to rate how helpful it would be to have additional resources for implementing emergency contraception in their practice. The final section asked demographic questions about the respondent.

Statistical analysis: I calculated simple frequencies and relative rates of response, and used these to compare emergency contraception practices and supportiveness among subgroups (based on gender, practice type, practice patterns, geographic setting, and views of barriers to use of emergency contraception) of respondents. To simplify some of the data analysis, the 5 point scale of supportiveness of offering ECPs to patients on request during an office visit (a main outcome of

interest) was compressed into 3 categories (“Not Supportive” and “Somewhat Unsupportive” were combined into a single negative category and “Supportive” and “Very Supportive” were combined into a single positive category).

Results

The sample of 138 respondents included 91 men (66%) and 46 women (33%). There was a broad range of practice types and practice settings represented in the sample

How Many Times Last Year Were ECPs Offered?

Seventy-two percent of respondents reported that their practices do not inform patients about the possibility and availability of emergency contraception. Forty-five percent have never offered ECPs; 49% offer ECPs 1-4 times/year; only 6% report offering ECPs regularly (five or more times/year) (Table 1). The number of times ECPs were offered in the past year did not differ significantly between men and women respondents. There were no significant differences in emergency contraception practice patterns between physicians in rural, small town, suburban, and urban practices, nor were there any significant differences in number of times offered per year based on practice type.

Supportiveness of Emergency Contraception

Overall, 70% of respondents supported offering ECPs on request during an office visit; 9% were neutral, and 21% were not supportive (Table 2). Half of the respondents favored phoning in ECP prescriptions for established patients. In contrast to their relative support of offering ECPs on request at the time of need, physicians were less likely to support informing patients about ECPs in advance of need. Only 44% endorsed mentioning ECPs during routine contraceptive counseling, and only 15% supported offering ECP prescriptions in advance of need. Less than one-fifth supported displaying brochures or posters to educate patients about ECPs, and only 5% supported mentioning ECPs in practice public relations materials.

As seen in Tables 2 and 3, women physicians were generally more supportive than men of all approaches to emergency contraception, including offering ECPs with an

Table 3. Demographic composition of sample and differences in outcomes

	Number in sample	Support ECPs	Offer ECPs
Gender			
Men	91 (66%)	62%	55%
Women	46 (33%)	80%	57%
No response	1 (1%)	100%	0%
Total	138 (100%)	68%*	55%
Practice type			
Solo	21 (15%)	48%	52%
Small group (<5 members)	39 (28%)	72%	49%
Large group (≥5 members)	48 (35%)	63%	65%
Academic	25 (18%)	84%	48%
Community health clinic	3 (2%)	100%	100%
No response	2 (1%)	100%	0%
Total	138 (100%)	68%*	55%
Practice setting			
Rural	28 (20%)	50%	54%
Small town	53 (38%)	77%	57%
Suburban	23 (17%)	57%	52%
Urban	30 (22%)	73%	57%
No response	4 (3%)	100%	50%
Total	138 (100%)	68%	55%

*Excluding non-responders to this question, 70% of physicians supported offering ECPs.

Table 4. Barriers to offering ECPs

Lack of patient knowledge	57%
Therapeutic window too short	54%
Lack of appropriately dosed and packaged pills	42%
Moral/ethical/religious opposition by patients	42%
Lack of physician knowledge	42%
Could decrease use of primary contraception by patients	42%
Confused with RU486	34%
Liability concerns	31%
Moral/ethical/religious opposition by physicians	29%
Moral/ethical/religious opposition by other health care professionals	25%

request. In terms of practice settings, physicians in rural practices were the least supportive of offering ECPs. (RR = .66; 95%CI .42 - .96; $p=.006$) (Table 3).

Barriers to Offering Emergency Contraception

The survey identified several important factors contributing to the relative infrequent provision of ECPs in family practices. Over half of respondents indicated that lack of patient knowledge and the short therapeutic

window (treating within 72 hours of intercourse) were important barriers to offering ECPs in their practice (Table 4).

Nearly one-third (29%) of respondents said that personal moral or ethical or religious considerations were important reasons why they did not offer ECPs in their practices (Table 4). Of all factors analyzed, an affirmative response to this question was the best predictor of opposition to offering ECPs. There was a nearly two-fold difference in support of offering ECPs between doctors who did not endorse moral or ethical or religious opposition to offering ECPs and those who did (RR= 1.7; 95% CI 1.18-2.48; $p=.001$).

Emergency Contraception Resources for Providers

A majority of respondents indicated that it would be

Table 5. Potentially helpful resources for using ECPs

Patient brochures	71%
ECP patient consent forms	66%
ECP educational materials for staff	64%
Continuing education on ECPs	60%
Medical journal articles on ECPs	59%
ECP prescription forms	53%
Phone access to information on ECPs	39%

office visit. (RR=1.3; 95% 1.05-1.62; $p=.025$). Solo physicians were least likely to support (RR = .66; 95% CI .42 - 1.05; $p=.03$) and academic physicians most likely to support (RR = 1.3; 95% CI 1.04-1.62; $p=.06$), offering ECPs on

helpful to have resource materials on emergency contraception, including patient education brochures, consent forms, staff education materials, and continuing education programs (Table 5).

Discussion

Offering emergency contraceptive pills (ECPs) in a primary care setting is a potentially viable but underutilized way to reduce unintended pregnancy and abortion. Most (70%) of the family physicians surveyed supported offering ECPs; however, only 6% offer ECPs regularly (5-10 times /year or more), 45% have never offered ECPs at all, and 72% of practices currently do not inform their patients about the possibility of emergency contraception.

Our results are consistent with many of the findings of a 1997 nation-wide Kaiser Family Foundation study of 237 respondents, but the present study showed slightly lower rates of supportiveness (70% vs 75%), of ever offering of ECPs (55% vs 65%), and informing patients about ECPs (28% vs 38%).¹¹

I also found more objection to emergency contraception. For example, 42% of respondents to my survey thought that ECPs could lead to decreased use of primary contraception, but only 13% of respondents in the Kaiser study thought so. However, both studies found similar levels of moral or religious or ethical opposition to ECPs (29% in our study and 27% in the Kaiser study). These differences may reflect both regional and methodological differences. Our study focused specifically on family physicians in North Carolina, in an attempt to explore the particular views that underlie current primary care practices and to assess interest in resources related to emergency contraception.

Limitations of our study: The somewhat low response rate of 39% limits the generalizability of the analysis. However, due to the logistics of the conference at which the survey was distributed, the number of people who actually saw the survey in their registration packet was less than the total number of physicians (354) who attended the conference. Thus, the true response rate was probably higher than 39%. Furthermore, the busy nature of the conference and the logistics of administering and collecting the questionnaire within the constraints of the conference probably limited response, but should not grossly distort the results.

The value-laden nature of this survey topic might well have prompted responses from those with strong opinions in either direction rather than from those with no opinion or interest, but those effects might tend to balance one another. Since my study used only a simple descriptive analysis, a very high response rate is not as critical as in more sophisticated statistical analyses.

The question of whether my results can be extrapolated,

even to North Carolina primary care physicians in general is not resolved. However, since the North Carolina Academy of Family Medicine is the largest and most visible professional organization of family physicians in North Carolina and since physicians trained in other fields, such as pediatrics or internal medicine, attend the academy meeting, the results of this study should be meaningful not only statewide but even beyond North Carolina.

Conclusions

Our results showed a large discrepancy between attitudes and practices concerning emergency contraception in the primary care setting. A significant majority of primary care physicians support offering ECPs, but only a small minority routinely do offer the service. Important perceived barriers to offering emergency contraception include a lack of patient knowledge; the brief therapeutic window for treatment; moral, ethical, or religious opposition; lack of physician knowledge; and the possibility that using ECPs would decrease use of primary contraception. Many of these barriers could be dealt with relatively easily.

Notably, the 29 % of respondents who cited moral or ethical or religious opposition were much more likely to oppose offering ECPs. The majority of family doctors do not have such ethical or religious qualms, but this factor was the strongest predictor of physician opposition to emergency contraception. Further discussion of the mechanism of action and the ethics of emergency contraception might lessen this barrier. In the experience of leaders in the field of emergency contraception, people are less likely to oppose emergency when they know that ECPs work primarily by inhibiting ovulation and not by aborting established pregnancies.

Interestingly, despite the overall strong support for ECPs, the physicians in our sample tended not to endorse informing patients about ECPs in advance of need. In light of the brief (72-hour) therapeutic window for using ECPs, the relative unwillingness of physicians to inform patients in advance of need poses a significant impediment to effective emergency contraception. If women do not know about the possibility of emergency contraception in advance, they will not know to ask their doctors for it when the need arises.

Despite the perceived barriers to offering ECPs, physicians in our sample indicated a strong interest in learning more about and getting resource materials relating to emergency contraception. There seems to be a high level interest among North Carolina primary care physicians for continuing education on emergency contraception, and for learning new perspectives and practice patterns.

In conclusion, although emergency contraception is not currently widely offered in the North Carolina primary care setting, the present study shows that there is support for and

interest in the use of emergency contraception for pregnancy prevention. Further discussion is needed within the medical community about the possibilities for reducing unintended pregnancy through the more widespread provision of emergency contraception.

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How many peer-reviewed journals do you know that encourage submissions from students and doctors in training? That give them the opportunity to develop their writing skills along with their scientific and clinical ones?

Read page 118.

The North Carolina Medical Journal

A Japanese Medical Student in a Medical Clerkship Program in North Carolina

Yuriko Muraki

I am a fifth year medical school student from Tokai University in Kanagawa, Japan, who participated in a clerkship exchange program at Wake Forest University School of Medicine in Winston-Salem, NC. I began my program with Wake Forest in October 1999 and would like to present my experience from the perspective of two different medical schools.

Medical School in Japan

Unlike medical students in the US, those in Japan enter medical school at age 18, directly from secondary education. The medical school program lasts six years, and students become licensed medical doctors after they successfully complete the program and pass a one-time medical license exam, conducted at the end of the medical school program. As in the US, first-year doctors typically enter a residency program after graduating from a medical school. The length of residency depends on the field they are engaged in. Some students seek their career in research and, instead of going directly to residency, choose to seek post-medical school programs.

My case is slightly different from the usual for medical school students in Japan. I received BA from a four-year university and decided to enter medical school as part of the "Gakushi" program. This program is designed for students with university degrees who seek a medical degree. The advantage of this program is that the students possess different backgrounds and skills. Some are dentists, teachers,

company workers, or students straight from undergraduate programs.

In Tokai University, after completing all class work and some of the clerkship programs in Japan, and after passing pre-qualifying exams to ensure that candidates have sufficient English and communication skills, students are allowed to participate in the clerkship exchange program. Tokai University has overseas clerkship exchange programs with medical schools in England, in New York, and in other major cities. The purpose of the exchange program is to provide multiple levels of experience and knowledge. Exchange students not only gain in medical experience but also have a valuable experience with another culture and learn to interact with people from different countries and backgrounds. I came to North Carolina in October, 1999, to begin my six-month program. This program has been in existence since 1990, and as part of the program, students from Wake Forest visit Japan for two to four months to participate in clerkship programs at Tokai University.



The author proudly displays her certificate from Wake Forest Medical School.

Medical Education in North Carolina

Before starting my rotations, I chose specialized areas in which I wanted to spend my time. Rotations in various fields are fixed by a pre-arranged rotation schedule, which I often followed. I was impressed that the organization and preparation of the rotation program well suited my objectives and

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background as a foreign medical school student. On my very first day at Baptist Hospital, I was assigned to understand the structure of the hospital by looking at the map. Because the hospital is so gigantic (the Tokai University Hospital is considered large by Japanese standards, but it was no match for Baptist Hospital) I found it easy to get lost, so I spent my first hours trying to become comfortable with the facilities.

During my six months' stay at the Wake Forest University School of Medicine, I had rotations in Infectious Disease, Hematology, Trauma Surgery, Anesthesiology, Obstetrics, Gynecology, Dermatology, Infertility, Family Medicine, and Plastic Surgery. My candid impression from my time in these rotations is that there are many differences between the Japanese and the American medical systems. In the clinic, for instance, every patient meets with doctors in individual rooms. In Japan, on the contrary, most hospitals and clinics do not have individual rooms in which to interact with patients. Instead, we have a partition wall—patients do not see other patients when they meet with doctors, but their conversations are easily overheard. It is evident from this alone that the US system places emphasis on protecting patients' privacy, whereas patients' privacy seems to be undetermined in Japan.

Another difference is the number of individual rooms in the hospital. In Japan, most patients share rooms with other patients—sometimes as many as six in one room. In the US, however, most patients are in individual rooms. This again seems based on individual privacy, and hospitals place great emphasis on securing comfortable environments for their patients. However, although Japan may be lacking on the privacy issues, I tend to think that there are some advantages to sharing rooms. For example, some patients may feel more secure and comfortable because sharing rooms may help them share the anxiety, worry, and pain that they experience from their illness. They can create a supportive environment that eases the stress and pain of being in the hospital. Patients sometimes even form lasting friendships after sharing rooms.

The Individual Rotations

I turn my attention now to observations of the differences that I noticed in each clerkship rotation.

Infectious Disease: In Japan, I never had an opportunity to deal with patients with HIV. As far as I know, in Japan, there were more than 4000 carriers of HIV but only 1500 patients with AIDS in 1998. Hence, there was no special department in Tokai University to deal only with HIV-positive carriers and patients.

Hematology: I was surprised to learn that all patients in this department are aware that they have cancer. In Japan, it is still often considered taboo to tell patients that they have cancer.

The decision not to inform is often driven by the wishes of their family members. Unlike in the US, in Japan there seems to be a strong resistance to telling patients that they have cancer. It is difficult to decide what drives the difference between two countries: perhaps an approach to the concept of death and an influence from religious thinking. I participated in the patient cancer support program in the Baptist Hospital, and had opportunities to meet with many volunteers who had overcome cancer. Through discussing their mindset and experience, I noticed a significant difference in the way patients perceive religion. In Japan, the mainstream religion is Buddhism, but it has been treated in such a ritualistic way that religious thinking has less and less impact on people's lives and attitudes. In the US, on the other hand, religious thinking is an important part of peoples' lives and has a strong impact on how they live and make decisions. My sense is that religion is not the only driving force behind revealing patients' diagnoses; also important was the idea that all patients have a right to know what they are going through, what options are available, and the ability to make their own decisions.

Obstetrics and Gynecology: These rotations turned out to provide one of my most exciting experiences. This was so because I was able to deliver a baby. During my obstetrics rotation in Japan, students were not allowed to deliver a baby but only to observe. I was also intrigued by learning more about contraception, particularly birth control pills. Only last year in Japan did pills become available for the prevention of pregnancy. However, there are still many on-going discussions about the use of birth control pills and ethical issues related to their use. In the past, condoms were the major contraceptive method in Japan. I believe this served to limit the spread of sexually transmitted diseases in Japan. I was also interested to find out that in the US, some use birth control pills for acne treatment—this is a phenomenon not yet seen in Japan.

Infertility: Firstly, I was astonished to learn that there are so many sperm banks in the US. I was also surprised to find that there is a catalog of sperm donors, which supplies detailed descriptions of donors, including nationality, age, educational background, and interests. It is difficult for me to envisage a similar development in Japan in near future. Discussions about this topic in Japan are still limited. Experts often provide diverse views of the ethical issues, and their opinions prohibit rapid growth of such activities in Japan. In fact, it is still rare even to find adoption in Japan.

Family Medicine: In Japan, the idea of a family physician is not common. Typically, patients visit a local doctor operating out of his own clinic. If that doctor identifies a serious illness requiring further care that can only be provided by larger hospitals, the doctor will send the patient to a university

hospital. As a result, Japanese university hospitals generally do not have a family medicine department, and most families in Japan do not have a family doctor as one would in the US.

Conclusion

During my six-month stay at the Baptist Hospital, I was very fortunate to work with people with various background and expertise. I thank all the staff of the hospital who provided me with invaluable experiences. The tenure of my rotation was too short to learn everything about the US medical system, but it certainly provided me with a special opportunity to interface with one of the most advanced medical systems today. The program actually let me sense the differences between the US and Japanese medical systems and practices. I think I know a little more now than before about why certain things are done differently and the logic behind them. Six months, although too short, clearly paved the way for me to broaden my medical experience by meeting professionals and patients from diversified backgrounds. I would strongly encourage other medical students to spend extra time in a different environment. It will let them maximize their medical perspectives and will, hopefully, carry a long way toward improving our medical profession.



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Lance Armstrong



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Sweet the Sound

Music in Medicine

Brandon Howard, MSIII

I first became interested in the use of music to relieve suffering when I served as a live-in volunteer at Human Service Alliance, a place of repose for patients with chronic or terminal illness in Winston-Salem, North Carolina. Joyce, a patient in her mid-30s, was bedridden with muscular dystrophy, which virtually paralyzed her body from the neck down. She was a quiet, pleasant person whose tense face and tired eyes betrayed her suffering. Part of my duties as attendant caregiver was to carry out range-of-motion exercises to loosen her muscles and relieve tension. During one session, I asked her if she liked music, and she said that she did.

I play the double bass, and have always liked playing in unusual settings. For example, as a college student commuting into Philadelphia for music lessons, I played for passengers on the subway. So in a spirit of sharing I brought in my bass the next day and played for Joyce. I chose a movement from Vivaldi, slow and contemplative. When I finished, her face seemed to shine with happiness and relief. For the first time, she said, she wasn't thinking about her pain. For someone whose world consisted of a droning television at the foot of the bed and twenty-four hours a day of gnawing feedback from her painful muscles, these sounds were welcome relief.

After this beginning with Joyce, I played for other patients and sang hymns with the other caregivers. Although some patients did not want to hear us at all, most patients felt the music added another dimension of warmth to the routine "medical" care of feeding, bathing, turning to prevent bedsores, and giving analgesics for pain. Just as remarkably, the music transformed the atmosphere from sterile and funereal to joyful and uninhibited. The caregivers enjoyed it greatly, and it enhanced our ability to work as a team. For me, music was a way of interfacing with a person literally on the other side of life, someone with whom I was often at a loss for words. I learned two points through my experience: that

music makes patients feel better, and that healthcare workers work better when music is around.

Music Therapy in the Context of History

The ancient Greeks and Romans considered music a fundamental part of physical and mental harmony. Pythagoras believed that daily singing and making music helped achieve emotional health. The Roman physician-historian Celsus prescribed music, specifically cymbals and other sounds, to treat melancholy. In the sixth century, Boethius commented on the different effects in infants exposed to lullabies, versus "shrill and harsh" melodies. Before being admitted to the study of medicine or law in medieval Europe, students first had to master music, which was part of the *Quadrivium*, the upper four—arithmetic, music, geometry, and astronomy—of the seven liberal arts taught in medieval universities (the lower three, or *Trivium*, being rhetoric, grammar, and logic). In the 18th century, physicians made the connection between music and medicine less abstract by applying it clinically. In 1748, Joseph Louis Roger wrote a treatise arguing that musical vibrations could help rid the body of unwanted humors and obstructions.

Music therapy in the contemporary sense began shortly after World War II. In 1948, Ainlay,¹ a US Army physician, described the need for programs to amuse soldiers convalescing in overcrowded military hospitals. From military hospitals, music therapy migrated to mental hospitals, and in 1950 the National Association for Music Therapy was established. Music therapists now treat a wide variety of patients, including children with mental handicaps or attention deficit disorders, adolescents and adults with visual, hearing, or speech impairment, schizophrenic and depressive patients, substance abuse patients, and psychotic patients.

The testimony of history emphasizes the therapeutic benefit of music, but only in recent times have we begun to elucidate how it works from a scientific point of view. In 1948, Altshuler, a psychiatrist, exhorted music therapists to

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obtain a scientific understanding of how music affects the mind and body. He proposed the thalamus as the location of aesthetic response, and thought that music, by stimulating this center directly and bypassing cerebral pathways, was able to "reach" severely disturbed patients. He wanted therapists to match the mood of the music with the mood of the patient. This is an important idea, for, as will be shown below, calming effects can be undone by inappropriate music. His "level attacks" principle advocated therapy that progressed from simple rhythm to melody, harmony, mood, and finally to pictorial-associative music.

The Effects of Music on Mind and Body

The Stress Response. Watkins² has hypothesized that music effects the stress response, a regulatory reaction mediated by the endocrine and nervous systems. The endocrine portion of the response consists of secretion of corticotropin-releasing hormone (CRH) from the hypothalamus. CRH stimulates the anterior pituitary to secrete ACTH, which in turn raises cortisol levels in plasma. Cortisol induces glucose production from protein, promotes fat metabolism, supports vascular responsiveness, modulates brain function and dampens the immune system. The nervous system portion involves the locus ceruleus, located at the junction of the midbrain and pons, which mediates release of epinephrine and norepinephrine from central and peripheral nerve terminals and epinephrine from the adrenal medulla. These catecholamines increase heart rate and blood pressure.

Musical sound, impinging on the eardrum, stimulates the cochlea and then the cochlear nuclei. Nerve impulses travel to the inferior colliculus, then to the medial geniculate body of the thalamus, and finally to the auditory cortex in the temporal lobes. The inferior colliculus has two functional regions, the core and the belt. The core region receives auditory stimuli from the dorsal cochlear nuclei and projects them to the cortex via the medial geniculate body. The belt region combines visual, somatic, and auditory information and sends it via the medial geniculate body to the lateral nucleus of the amygdala and auditory cortex.

Modulatory input, originating in the auditory cortex, is thought to affect lower centers via three pathways: 1) a projection directly to the amygdala, 2) a projection to the medial geniculate body of the thalamus, and 3) a projection to the inferior colliculus of the midbrain, and then to dorsal cochlear nucleus, superior olivary complex, and ventral cochlear nuclei of the medulla. A link between the stress response and the auditory pathway may involve the amygdala

and hypothalamus. Nitecka and Frotscher³ claim that both the basolateral and centromedial regions of the amygdala affect endocrine response. When the basolateral region, to which the ascending auditory system projects, is stimulated, endocrine function is inhibited; when the latter centromedial region is stimulated, endocrine function is enhanced. The central nucleus of the amygdala is the origin of an important descending projection to the cardioregulatory nuclei of the dorsomedial and ventrolateral medulla; when stimulated it produces bradycardia and hypotension.⁴ The major neurotransmitter of the central nucleus is an inhibitory one, gamma-aminobutyric acid (GABA), suggesting that increased neural activity may reduce the stress response, but no clear connection between the central nucleus and the lateral nucleus serving the auditory pathway has yet been found.

"I learned two points through my experience: that music makes patients feel better, and that healthcare workers work better when music is around."

Higher Cognitive Function. Not only does music diminish stress response and induce relaxation, it also affects higher cognitive functions and brain lateralization. Listening to Mozart enhances college students' ability to perform spatial-temporal tasks. Rauscher et al⁵ divided 36 undergraduates into five groups - a control group exposed to only silence; a group exposed to compositions of Philip Glass (repetitive, "minimalist" music); a group listening to a story; a group watching a dance piece; and a group exposed to Mozart's Sonata for Two Pianos, K. 448. All subjects then completed test questions on the Stanford-Binet IQ test and performed sequential paper-cutting tasks. The Mozart group achieved the highest scores, an effect that persisted for 5-10 minutes.

The results of this experiment can best be understood by considering the trion model of the cortex proposed by Leng and Shaw.⁶ These authors suggest that there are cortical columns, each comprised of subunit minicolumns, or "trions." Trions in a column have inherent, periodic firing patterns, which can be enhanced or excited by small changes in synapse activity. The patterns relate to each other in a symmetrical fashion, and maps of evolving firing strengths display symmetrical shapes - for instance, a diamond. Leng and Shaw propose that music enhances the ability of trions to develop patterns that correlate with non-verbal cognitive abilities. Rauscher et al⁵ ascribe the enhancement of the spatial-temporal abilities by music to the organizing the cortical firing patterns, stabilizing certain ones more than others.

Since music acts over time, it is certainly possible that coherent, "mathematical" music like Mozart's, which possesses so many symmetries in terms of melody and form, might excite and prime the sequential flow of cortical firing. Leng and Shaw point out that spatial tasks are performed by the right hemisphere of the brain. The right hemisphere also underwrites rudimentary speech, stereognosis, and emo

tional or "prosodic" aspects of language.⁷ It is no coincidence that music affects spatial functions because the mechanisms for musical perception are located mostly in the right temporal lobe. The right hemisphere is more accurate than the left in discriminating intensity, chords and melodies, but the left appears to be more important in perceiving rhythm. When the right hemisphere is anesthetized by injection of sodium amytal into the right carotid artery, subjects lose all sense of a song's melody, whereas anesthesia of the left hemisphere function, causes lyrics to be lost but not melody.⁸ I will return to these ideas when we examine the treatment of specific disorders.

Music and Development. Studies of the effect of music on the development of premature infants are inconclusive. Malloy⁹ divided 127 infants of 183-230 days gestation into two groups; one listened to a tape recording of mother's voice, and the other to a tape of Brahms' Lullaby. While in the hospital, the infants exposed to Brahms gained weight faster than the group listening to mother's voice, but 9 months later there were no significant differences in mental or motor development. This result may be explained by the transitory nature of the "Mozart effect" noted earlier. Still, the infant brain is much more plastic than the adult, especially in response to environmental stimuli, so the lack of long-term effect is perplexing.

Specific Applications of Music Therapy

Schizophrenia. Tang et al.¹⁰ studied music therapy in the rehabilitation of patients with residual schizophrenia. Patients with schizophrenia may have positive symptoms (conceptual disorganization, delusions, or hallucinations), or negative symptoms (loss of function, anhedonia, decreased emotional expression, decreased concentration, and diminished social engagement). Schizophrenia is categorized into four types: catatonic, paranoid, disorganized, and residual.¹¹ Patients with residual schizophrenia have negative symptoms but no delusions, hallucinations, or motor disturbances. Antipsychotic medications can be helpful in treating schizophrenia, but they do not prevent the deterioration of social functioning, so non-drug therapies are crucial for treating residual schizophrenics. Tang and colleagues randomly assigned 76 patients to listen to music individually, to sing as a group, and to play Western and Chinese musical instruments, or not (the control group). Before each song was sung, the context, style, and imagery were explained. Results were measured with the Scale for Assessment of Negative Symptoms and the Disability Assessment Scale. All symptoms (affective flattening, poverty of speech, decreased motivation, loss of interest, attention deficit) improved somewhat with treatment. Subjects with less schooling showed more improvement in social withdrawal than those with more

schooling; subjects with a positive family history of schizophrenia showed a greater improvement in level of interest in external events than those with no family history. Those who had no prior recreational therapy showed greater improvement in affective flattening than those with prior activities. These findings suggest that increased social interaction was more important than music itself for these residual schizophrenics, but the study has several drawbacks: (1) control subjects had no "placebo" social activities comparable to the therapy group, (2) the treatment group were taking a higher average dose of chlorpromazine than the control group, and (3) the study did not address whether therapy continued beyond one month would yield further gains. The authors make the important point that music, besides being a means of expression, reflects life in society. Perhaps, by analogy, music therapy brought these patients back into current society, in the process promoting interpersonal interactions, energizing the patients, and preventing aggression.

Depression. Music therapy appears to help depressed older adults. Hanser et al.¹² randomly assigned 30 patients with major or minor depressive disorder to one of three 8-week programs: (1) weekly home sessions with a music therapist to learn techniques of stress reduction by listening to music; (2) self-learning of techniques of stress reduction by listening to music (with a weekly phone call from the therapist); and (3) a control group. The music therapy groups showed clinically significant improvement in standardized tests of depression, distress, self-esteem and mood, and the improvement was maintained over 9 months of follow-up. Since many elderly persons are homebound, music therapy offers a positive (and innocuous) way to treat depression. It could easily be carried out concomitantly with—perhaps even facilitate—other home health treatments such as oxygen therapy or physical therapy.

Anxiety Disorders. Music has been used in a variety of clinical settings to reduce anxiety. In all cases, lessened patient anxiety has led to better psychological and physiological outcomes. Anesthesiology has made the most use of music as an anxiolytic. In a series of clinical trials involving 8,000 patients in various clinics across Europe and Asia, Spintge et al.¹³ found perioperative anxiety in 17% of patients listening to music compared to a minimum of 26% in those who did not listen to music. Patients preferred music to sedative drugs, and needed only half as much sedative and analgesic drugs. In all trials, blood levels of cortisol, ACTH, prolactin and b-endorphin were lowered by music therapy.

Miscellaneous Conditions. Music has been a real help during labor in the obstetrics ward. It decreases levels of ACTH, blood pressure, and heart rate before and during labor, and, on the first postpartum day, more than the husband's presence. Dentists in the U.S. and Scandinavia have used audioanalgesia for 80 years. It not only reduces the levels of

stress hormones but increases secretory IgA levels in the mucosa.¹⁴ Playing an instrument such as piano, violin, triangle, or xylophone increases patient cooperation and motivation during mobilization therapy for rheumatic disease. Music helped decrease the fears experienced by myocardial infarction patients enough that they could participate in physical exercise sessions.

Neonatal Intensive Care: Standley et al¹⁵ studied 20 low-birth-weight infants in an intensive care unit. Infants who listened for 20 minutes to a lullaby sung by a female vocalist (compared to a recording of the mother's voice) had much higher blood oxygen saturation and fewer hypoxemic events during the treatment on the first post-partum day. The difference disappeared on days 2 and 3. Blood oxygen saturation levels fell right after the music stopped, but there was no similar response in the babies listening to maternal voice. The authors suggest that music may have so profoundly affected oxygen uptake that stopping the music disrupted autonomic responses. Possibly, infants need brief segments of music alternated with silence. The authors never discuss the fact that the experiment compared female singing to female speaking, but they found recorded music to be easier to obtain than recordings of the mother's voice.

Palliative Care: Last and most important is the use of music therapy in palliative care—the improvement of quality of life in patients who have incurable, chronic, and debilitating disease. These persons coming to the end of their lives may be burdened by regrets or loneliness which they find difficult to articulate or relate to others. At Bethlehem Hospital in Victoria, Australia, patients are referred to the Music Therapy Department for help with coping difficulties, depression or withdrawal, isolation, difficulty expressing feelings, complex and distressing physical symptoms, and cultural language barriers. Bridget Hogan, chief music therapist at the hospital, says that “music therapy assists terminally ill patients in finding a path of acceptance and existential resolution from which to leave their bodies, separating themselves from this world to the next.”¹⁶

For patients who, because of disease or fear, cannot express their emotions, Hogan uses “song choice” in which the patient chooses a familiar song and feels a sense of achievement and greater control over the environment. Some patients assemble tape recordings of the songs they have chosen; the tape becomes an expression of their feelings and fears and enables them to relate better to their loved ones. They may play this recording to soothe themselves during periods of loneliness or pain. Hogan also uses live performance. She takes care to match the pitch, rhythm, and tempo

of the music to the patient. Low-pitched music may be comforting; a wide pitch range may facilitate emotional release, a narrow range may give a feeling of security, and so forth. A regular rhythm matched to the patient's respiration rate can be soothing in times of breathing difficulty, and a faster, irregular rhythm can excite and engage the patient if that is called for. In general, music should match the patient's mood, for just as soft music can have anxiolytic effects, unfamiliar, loud, harsh or fast music can induce anxiety.

Another component of Hogan's therapy is “Life Review.” She invites patients to sing about their past, or to create songs and discuss memories and associations triggered by certain words. When patients are severely cognitively impaired, a very structured approach is required. O'Callaghan¹⁷ presented patients with chords and melodic fragments from

a song (either improvised or well-known), and then invited patients to make up the words. The subject matter of these impromptu songs often revealed themes very much in line with the aims of palliative care: messages of positive feelings for people, memories of relationships, expressions of the hardship of living with illness, and gratitude to family members and God. Saunders, one of the founders of the hospice movement, writes that “the last days of living should not be seen as defeat but as life's fulfillment. It is not merely a time of negation but an opportunity for positive achievement. One of the ways we can help our patients most is to believe and expect

this.”¹⁸ Families of patients are sometimes skeptical of this explanation, but is crucial to their acceptance of their loved one's terminal condition. Rachel Robbins, a music therapist with the Duke Oncology Recreation Therapy program, leads whole families in singing songs with the patient. She believes that it helps the family accept the dying process. According to Robbins, “music therapy often helps the family more than it helps the patient.”

Beyond the Clinical Use of Sound

Melodic Intonation Therapy, a variant of speech therapy, asks patients speak with a simplified and exaggerated prosody, consisting of a melody (for example, two notes, high and low), and rhythm (two durations, long and short). It is helpful in language rehabilitation of patients with persistent aphasia.¹⁹ Another emerging modality is vibroacoustic therapy,²⁰ in which pulsed, low-frequency pure tones are delivered to the body via loudspeakers built into a chair or bed unit. Robbins reports using a vibroacoustic reclining chair in cancer pain management.

Music therapy can improve the functioning of the

"The music therapy groups showed clinically significant improvement in standardized tests of depression, distress, self-esteem and mood, and the improvement was maintained over 9 months of follow-up."

medical team, as well as enhance the environment. Music therapy, like other art therapy, can relieve the stress of medical professionals. Clark and Zeldow²¹ found that 12% of medical students suffered from clinical depression during the first three years of medical school. A national survey found that third-year residents have higher rates of alcohol and benzodiazepine use than their counterparts not in medicine. As discussed previously, good data suggest that music induces relaxation. In addition, music therapy enriches staff function because it allows the health care professionals to be more creative and to fulfill expressive needs, both of which are crucial to the two-way interchange that leads to empathy with the patient. Since creativity draws on inner resources, it builds strength and confidence, and this gives the patient confidence that therapy will have a good outcome.

Trygve Aasgaard²² writes that therapy should not be centered just on the patient; it should treat the whole milieu. Aasgaard says that music therapy diminishes hierarchies of authority and removes barriers between patient and clinician in the hospice and pediatric oncology ward. As he writes, "hospices and hospital wards can easily become arenas where illness and suffering predominate. This will affect not only patients and relatives but also the staff."²³ The professional caregiver has to engage his or her attention to ways of obtaining a good institutional quality of life."

From antiquity, music has been recognized as valuable in treatment. The biomedical and neurobiological observations of recent years have elucidated its effects. Music therapy and related modalities have been used to treat specific conditions, as well as to enrich the environment in which care takes place. As our elderly population grows, so will the proportion of patients with chronic, debilitating conditions. Because it is a cost-effective form of palliative care, music therapy will play an increasingly important role in healthcare. Then why, we might ask, isn't music therapy and arts medicine a part of medical school curriculums, as it was in the medieval *Quadrivium*? Like any clinical intervention, the proper use of music in medicine takes skill and training. The science underlying this intervention is already available; now we need proper attention to the clinical aspect, for it will reap great rewards in the care of patients.

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The *Journal* will consider for publication articles relating to and illuminating medical science, practice, and history; editorials and opinion pieces; letters; personal accounts; poetry and whimsical musings; and photographs and drawings. Papers that relate to the present, past, or future practice of the health professions in North Carolina are especially pertinent, but manuscripts reflecting other perspectives or topics are welcomed. Prospective authors should feel free to discuss potential articles with the editors.

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Prepare papers according to the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" (N Engl J Med 1991;324:424-8) with the following exceptions: 1) no abstract is needed; 2) no running title is needed; and 3) report measurements in metric units; use of the International System of Units (SI) is optional.

Submit a cover letter and a 3 1/2-inch computer disk that contains the text written in MS DOS- or Macintosh-compatible format. *Also enclose three hard copies of the text for review purposes.* Double space text with one-inch margins. *Please do not "format" the text* (e.g. no variations in type size, no bold face, no italics, no embedded endnotes).

Submit photographic illustrations, in duplicate, as high-quality color 35mm slides or 5-by-7 or 8-by-10-inch glossy prints, or as black-and-white glossy prints (5-by-7 or 8-by-10-inch). Label all illustrations with author's name, number them sequentially according to their position in the text, and indicate the orientation of the images, if necessary. *Do not write directly on the backs of prints.* This can damage them. If figures require printing in four-color process, we may ask the author to pay printing fees or a portion thereof.

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May 24

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Place: Bryan Student Center, Duke Univ, Durham, NC
Credit: 5 hours, Category 1, AMA
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Credit: Up to 17 hours, Category 1, AMA
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Place: The Cloister, Sea Island, Georgia
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Index to Advertisers

American Academy of Dermatology	165
Clinic Pro Software	139
Compusystems	back cover
First Citizens Bank	inside front cover
Mag Mutual	149
Make-A-Wish Foundation	153
Medical Mutual	inside back cover
Med Track	147
NC Academy of Physician Assistants	150-151
Nextel	113
Physician Solutions	117
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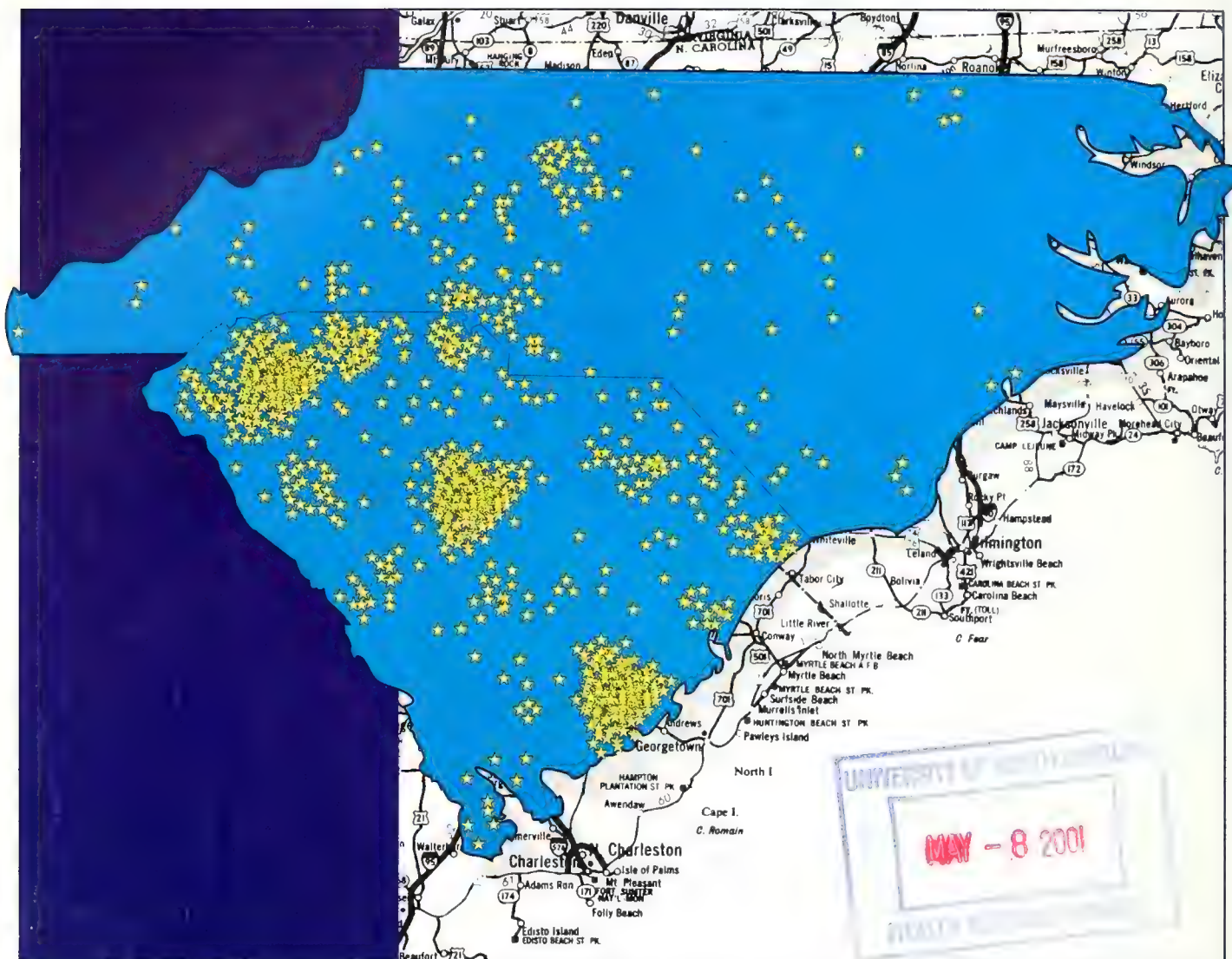
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North Carolina Medical Journal

For Doctors and Their Patients



In this issue:

- ◆ *Trust between doctor and patient*
- ◆ *Videolaparoscopy*
- ◆ *Vena cava syndrome*
- ◆ *Measuring up to Medicare*
- ◆ *Spirituality and healing*
- ◆ *Helicobacter pylori*
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For Doctors and Their Patients

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North Carolina Medical Journal

FOR DOCTORS AND THEIR PATIENTS

July/August 2001, Volume 62, Number 4

DIMENSIONS OF DOCTORING

- 188 Do Patients Trust Their Doctors? Does It Matter? *Mark A. Hall, JD*
Commentary: *Conrad Fulkerson, MD*

- 192 When Medical Meets Spiritual *Yi-Kong Keung, MBBS, FACP, and Richard McQuellon, PhD*
Commentary: *Francis A. Neelon, MD*

THE SPECTRUM OF DISEASE

- 198 *Helicobacter Pylori*: A View From a Primary Care Perspective
Mrugeshkumar K. Shah, MD, MPH, MS, Stephanie H. Shah, MD,
and Parinda K. Fruchtman, MD

MODERN MEDICINE

- 205 Videolaparoscopy in General Surgery: An Update
Venkatachala I. Sreenivas, MD, FACS,
and Viswandadham Pothula, MD, FACS

FIRST-PERSON PHYSICIAN

- 210 Two Neurosurgeons: A Bond between Nicaragua and North Carolina *William G. Sullivan, MD*

QUALITY OF CARE

- 212 How Close Is North Carolina to Meeting Medicare's Clinical Priorities?
Meera Kelley, MD, Jill McArdle, MSPH, RN, Robert Weiser,
and Ross Simpson, Jr., MD, PhD

CASE REPORT

- 220 A Breathless, Bloated Young Man: Superior Vena Cava Syndrome
E. Jackson Allison, Jr., MD, MPH, FACEP, Jawad A. Arshad, MD,
Rodney L. McCaskill, MD, FACEP, and Charles K. Brown, MD, FACEP

THE NAMES AND FACES OF MEDICINE

- 224 Some Reflections on the Origins of Biological Psychiatry *Guy K. Palmes, MD*

BULLETIN BOARD

- | | | | |
|-----|------------------------|-----|-------------------------|
| 182 | Letters to the Editor | 233 | Clinical Reflections |
| 184 | Running the Numbers | 234 | CME Calendar |
| 186 | Three Poems | 235 | Instructions to Authors |
| 229 | Classified Ads | 236 | Speaking of Medicine |
| 230 | NCMS Endorsed Programs | 236 | Index of Advertisers |
| 231 | New Members | | |

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Letters to the Editor

Remembering a Model Educator

To the Editor:

As I read Bill Hensel's article in the *Journal* ["The Education of an Educator," NC Med J 2001;62(3):122-3], I thought back fondly on my own family medicine residency/ chief residency at Moses Cone. It is a unique program where the residents are appreciated and treated as colleagues. Where learning is enjoyable, even in the face of long hours and hard work. All of the faculty members are great, but there is something special about Bill Hensel. Not only is he an excellent educator, he is a friend and a role model. You learn early that nothing is more important to him than family. What a great example to future practitioners! How appropriate that "The Education of an Educator" was written by the consummate educator himself. Thanks for the memories, Bill. And thanks to the *Journal* for allowing me to tell Dr. Hensel what our time together meant to me.

Robert M. James, MD, JD
Randolph Medical Associates
504 N. Greensboro St.
Liberty, NC 27298

An Open Letter to United Health Care

To the Editor:

About six weeks ago I got a call from my patient of many years. A man in his 70s, he had entered into another cycle of his depression. He had been hospitalized about two years ago and, after much manipulation of medicine, had been discharged on a regimen that led to "feeling normal" and to gradual discontinuation of medications about six months ago. He was "not bad," but the medications were reinstituted—slowly, because he lived alone and had to drive from Raleigh.

At first he showed improvement on his weekly visits; then he clearly worsened, losing weight, looking disheveled, having difficulty making the trip, "staying in the house," experiencing trouble going out to shop for groceries, but not actively thinking of suicide.

I arranged an emergency consultation with a psychiatrist, who agreed that hospitalization was indicated and (with difficulty because beds were tight) got him admitted. On being notified that he was in, I went to see him. When I got there, he had been sent home: United Health Care had denied the hospitalization on grounds that the patient was not homicidal or suicidal.

It is a fascination to me that criteria for in-hospital treatment hinge on those two issues. There are other factors that warrant hospitalization: It is reasonable to observe the patient's response to drugs, even when the same drugs are being used as for prior episodes—the patient, already old, is now older and his pharmacologic response may have changed. Furthermore, in this case, outpatient therapy was inadequate, and we needed time for observation to decide whether electroshock therapy was warranted.

Maybe you don't need a primary physician who has known and worked with the patient and appreciates the depth of his illness to work out treatment plans. Maybe generic protocol indications for hospitalization are the way medicine and psychiatry should be practiced. As things stand now, the organizational split between medicine and psychiatry widens—Brave New World!

James A. Bryan II, MD
Department of Medicine
UNC CB #7110
Chapel Hill, NC 27599-7110

The Journal's Friends Speak Out

To the Editor:

Despite Dr. Neelon's current editorial, "These Are the Times That Try," and past admonitions, I suspect a significant number of North Carolina physicians are not aware of the plight of the *North Carolina Medical Journal*. If they were or could be made fully aware, I can't believe they would permit its demise.

During the 150+ years of its heritage and tradition, the *Journal* has reflected physicians' concerns with patient service and care, but also with the science and scholarly aspects of medicine. I am proud to share my copies of the *Journal* with patients and other physicians. It is a model of scientific and caring journalism. It informs the busy practitioner and offers the opportunity for dialogue while generating better public relations, including goodwill.

Why does the North Carolina Medical Society find it difficult to underwrite the publication of the *Journal*? Where does its leadership stand on this issue? A strong advocacy on their part could surely find and support a solution to this problem. Or have we fallen into the trap of big business, where the "bottom line" is the major concern, more important than patient care and scientific inquiry?

I will be happy to contribute \$100 per year toward the continued publication of our *Journal*. Surely there are enough physicians willing to make a similar commitment to ensure its continued publication. Let's set an example for the leadership of the North Carolina Medical Society. The *Journal* ultimately reflects the best of medicine: our dedication to our profession and to our patients.

Robert McLelland, MD
3716 Saint Marks Road
Durham, NC 27707

To the Editor:

Your recent editorial was compelling—but I'd change the math. Instead of 300 doctors sending \$100 each, how about 100 sending \$300 each? Good luck.

Marvin P. Rozear, MD
Box 3849
Duke University Medical Center
Durham, NC 27710

To the Editor:

I found your journal website, and your magazine is extremely interesting and informative. I was wondering how I would go about getting a subscription to it, and the price.

Mark Corbett
2728 Meridian Drive, #2
Greenville, NC 27834

To the Editor:

Recently I was privileged to participate in the Jared Goldstein Lectures on Ethics and Values in Medical Practice. Were it not for the *North Carolina Medical Journal*, I would never have heard of Jared Goldstein, a family doctor in rural North Carolina who, before his untimely death, wrote on the importance of a caring physician-patient relationship.

That is only one of many subjects of importance to the health of our state that can be found *only* in the *Journal*. Where else would I get periodic commentaries on the health statistics in NC, learn about historical aspects of medicine in North Carolina, and read the thoughtful columns of physicians practicing in this state?

The *Journal* makes a unique contribution to my medical knowledge. I hope that funds will be found to assure the continued survival of the NCMJ.

Jessica Schorr Saxe, MD
1801 Rozzelles Ferry Rd.
Charlotte, N.C 28208

To the Editor:

Thanks a lot for the *Journal*. Please keep trying.

George E. Eddins, Jr.
24859 Norwood Road
Albemarle, NC 28001

From the Editor:

An Update on the Status of the Journal and a Note of Thanks

In response to the pleas of the editor, a number of readers have sent financial contributions to the North Carolina Medical Society Foundation, to be used to support the operations of the *Journal*. So far we have received about \$28,000—enough to ensure publication through the end of this year. Those of us who love the *Journal* are deeply grateful and thank all who have contributed. We plan to publish a list of names in the forthcoming issue.

Several of you have written us voicing verbal as well as monetary support. Dr. Rozear included a mathematical solution to our financial problems. The *Journal* needs roughly \$100,000 a year to keep on publishing. One hundred dollars a year from 1000 readers would keep us in business; Dr. Rozear suggests that \$300 contributions from 350 readers would work as well. Can't fault his arithmetic! but the hard reality is that we will need more money and need it right now—otherwise we will have to close up shop in December. Any readers who have been planning to give need to do so now. Anyone who wants to up his ante needs to do so now. We will let you know in the next issue how we stand.

Running the Numbers

A Periodic Feature to Inform North Carolina Physicians and Their Patients
About Current Topics in Health Statistics

Paul A. Buescher, PhD, Editor

Medicaid Costs Associated with Low Birth Weight

The number of children born at low weight is a serious and increasing problem in North Carolina. Despite the fact that the infant mortality rate fell by 14% between 1990 and 1999, the percentage of live-born children who weighed less than 2,500 grams increased by 11% (from 8.0 to 8.9). Most low-weight births occur because of pre-term delivery. The percentage of low-weight births resulting from deliveries of more than a single child has been increasing and now accounts for about 21% of low-weight births.

The costs of health care for low-weight infants are substantial. We cannot measure the amount directly from birth records, since they provide no cost information. But by linking birth certificates to Medicaid paid claims records, the State Center for Health Statistics has been able to relate low birth weight to Medicaid expenditures. Each birth certificate is matched to Medicaid newborn hospitalization records to identify Medicaid births, then the Medicaid ID number is used to track expenditures for these infants up to age one year. The following table presents results for 1998 births, the latest available year of matched data.

One-year Medicaid expenditures for live-born children in 1998

Birth weight	Number of births	Average cost/child	Total costs
< 1,500 grams	983 (2.1%)	\$56,918	\$ 55,950,245
1,500-2,499 grams	4,056 (8.7%)	\$ 8,050	\$ 32,651,052
>2,500 grams	41,662 (89.2%)	\$ 2,909	\$121,201,217
Total	46,701 (100%)	\$ 4,492	\$209,802,514

More than 40% of the infants born to North Carolina residents in 1998 were to Medicaid recipients; 10.8% of them weighed less than 2,500 grams at birth. This percentage is higher than the state average, as might be expected in this low-income population. The average Medicaid expenditure for children born weighing less than 1,500 grams is dramatically higher than for children born weighing more. Considering that approximately 30% of these very low birth-weight babies die as infants (most within the first week), the average expenditure would be higher still if only the survivors of infancy were considered.

These Medicaid statistics probably understate the true costs of low birth weight in North Carolina. Medicaid pays a smaller portion of the amount billed by providers than most other insurance carriers. Nevertheless, these data dramatically underscore the large health care expenditures associated with low birth weight in North Carolina, and emphasize the need to find effective ways to reduce low birth weight and pre-term delivery.

From the State Center for Health Statistics
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Three Poems

by
Ed Spudis, MD

Medical Scientist Perceives Kroger's

Using his category-driven reentrant networks,
he pushes swiftly past a case with nineteen varieties of
feta, releases several CAMs in front of the cholesterol-"reduced" hot dogs,
blasts his area-17, virtual-group, grandmother cells over peanut
butters, follows a sprightly *homo habilis* homemaker while
skillfully dampening his Hebbian uncertainty principles,
ultimately forced to make the critical biologic choice
at the check-out counter: "Paper or plastic?"

Habla Inglés in Winston-Salem?

Our Free Clinic, inspired by warm-hearted, elderly medicos
with good name recognition, offered a unique opportunity
to learn kitsch-y labels for Spanish body parts and relive
fading stories of medical lifestyles over many decades.
Weeks of sniffles and diarrheas went by before
a challenge wobbled in with her grandson, who explained
that she was Peruvian with one formal year of schooling.
She was tiny, smiling, had a wide gait, no tendon reflexes, diastolic BP
of 115, and severe field constrictions from peripheral petechiae.
As I considered how her life must have been so very un-Carolinian,
and mulled over which studies to arrange first, the grandson said,
"We have to go now. She folds boxes in a furniture factory
from eleven p.m. to seven a.m. on week nights. "

Waves into Jiggles by 2021

Our dusty old aluminum Grass Co. brain-waver
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hopeful parents would sit with their puzzled six-year-olds,
anticipating some epiphanous pattern from
the endless stream of 8-to-9-cycles-per-second
humanness waves, jostled by the slower parietal
personhood deflections, knowing that the
highly respected interpreter would understand what
sends these tiny, orbiting carbon atoms slathering
upward from the glutamate granules of 50 billion
neurons through bone and scalp to advise
simplicitically the 1/2 mm streams of black ink escaping
from eight pen tips, now "up," now "half up," now
"down," with no reason to anticipate our present
decarbonized nanobot implantations of 2021, which
have thoroughly eliminated Parkinsonism, schizophrenia,
attention deficits, Munchausen's-by-proxy,
and even a few cases of fibromyalgic reflex
sympathetic causalgia.

Dr. Spudis casts his bemused, capricious eye on
medicine and society from Forsyth Medical Center in
Winston-Salem. He is also Emeritus Clinical Professor
of Neurology at Wake Forest Medical School.

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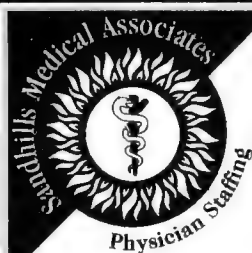
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Do Patients Trust Their Doctors? Does It Matter?

Mark A. Hall, JD

Trust has long been recognized as a central element of the doctor-patient relationship. Until recently, though, trust has seldom been studied or carefully analyzed.¹ This situation is beginning to change. A number of scholars and researchers around the country are studying trust in the medical setting—how patients' trust both doctors and medical institutions. In this article I give an overview of the growing body of conceptual and empirical knowledge.

The Importance of Trust

There are many good reasons why we should do more than just talk about trust. Trust has both intrinsic and instrumental value in medicine. By intrinsic value, I mean trust is a core-defining characteristic of the doctor-patient relationship, one that makes the relationship important *in itself*, without regard to any other purpose. Trust gives the doctor-patient relationship meaning, importance, and substance, in the same way that love and commitment give meaning and define the quality of spousal relationships. Sir James Spence, MD, a respected British physician defined the central role of trust as follows:

The real work of a doctor is . . . not an affair of health centres, or public clinics, or operating theatres, or laboratories, or hospital beds. These techniques have their place in medicine, but they are not medicine. The essential unit of medical practice is the occasion when, in the intimacy of the consulting room or sick room, a person who is ill or believes himself to be ill, seeks the advice of a doctor whom he trusts.²

The author is Professor of Law and Public Health at Wake Forest University Medical School. He can be reached there at the Department of Public Health Sciences, Medical Center Blvd., Winston-Salem NC 27157-1063, or by email at mhall@wfubmc.edu. This article is adapted from a speech he gave to the Durham-Orange County Medical Society.

Trust affects many important patient behaviors and attitudes. Trust is necessary if patients are to seek care, reveal sensitive personal information, submit to treatment, and follow treatment recommendations. Beyond these mechanical aspects of medical care, trust plays a critical role in clinical outcomes. A growing body of work suggests that trust mediates the interaction of mind and body that lies behind well-known phenomena like the placebo effect, non-specific healing, alternative medicine, and unexplained variation in outcomes from conventional therapies. It is not too great a stretch to say that trust underlies the mind-body interactions that mediate the effectiveness of almost all treatment.

What Is Trust?

We begin our understanding of trust with a more precise definition and conceptual map. Trust implies a willingness to be vulnerable with respect to medical care, expecting that the doctor intends to and will guard the patient's best interests. Several important components of this definition merit further elaboration. Trust is more than a mere predictor of positive results. Trust has a strong emotive component, based on the psychological features of seeking care in a state of illness. Trust arises in the setting of a patient's intense vulnerability, created by illness and by the requirement to submit to treatment. Trust also depends on critical assumptions about doctors' motivations, as well as their skills. Trust differs from satisfaction, in that trust is forward-looking rather than a mere reflection of past treatment encounters.

A conceptual model of trust must distinguish the different objects of trust. Most of our focus is on trust in doctors, but trust in nurses and other care-providers is equally important, and so is trust in medical institutions like hospitals or health plans. And finally there must be trust in the medical profession itself, and the overall system of scientific medicine. Each of these objects of trust—individual providers, institutions, and the profession itself—is importantly related

to the others so that they can either complement or interfere with one another.

The Components of Trust

In the work that I and my colleagues at Wake Forest University have done, we have divided trust into various components of what doctors are trusted with or about. When we began our studies, we assumed that trust had four components: competence, agency, honesty, and confidentiality. I will elaborate briefly on each.

Competence entails both technical skill and interpersonal skill. Technical skill refers to the ability to avoid mistakes and to do the right thing. Interpersonal skill encompasses both effective communication and appropriate bedside manner.

Agency, also known as loyalty, means acting on behalf of the patient's best interests. It entails caring, advocacy, and avoiding conflicts of interest.

Honesty means telling the truth, avoiding intentional lies, and not misleading patients or withholding important information. Trust in the sense we are using it does not necessarily require absolute, literal, unthinking "honesty" about every aspect or facet of a patient's case. Sometimes the "brutal truth" has to be softened or withheld, lest it diminish trust and heighten anxiety.

Confidentiality refers to the proper use of private information. We have found that patients are less concerned about confidentiality than public policy analysts often suppose. In our studies the general level of concern about confidentiality is lower than we had expected, and variation in concern about confidentiality is *not* strongly correlated with variations in trust. We have concluded that confidentiality is not important enough to retain as one of the core components of instruments that measure trust.

Several research teams have developed psychometric instruments to measure trust. Each team has independently reached the somewhat surprising conclusion that the hypothetical dimensions of trust (competence, agency, honesty, and confidentiality) are not independent of each other.³⁻⁶ In psychometric terms, this means that trust is composed of a single, global factor, not multiple factors. At first this might seem to indicate a lack of sensitivity in our measurement

Table. Sample questions used in survey measures of trust

- Your doctor will do whatever it takes to get you all the care you need.
- Sometimes your doctor cares more about what is convenient for [him/her] than about your medical needs.
- Your doctor only thinks about what is best for you.
- Your doctor's medical skills are not as good as they should be.
- Your doctor is extremely thorough and careful.
- You completely trust your doctor's decisions about which medical treatments are best for you.
- Sometimes your doctor doesn't pay full attention to what you're trying to tell him/her.
- Your doctor is totally honest in telling you about all of the different treatment options available for your condition.
- You have no worries about putting your life in your doctor's hands.
- All in all, you have complete trust in your doctor.

instruments, but instead we think it shows an important attribute of trust: namely, that peoples' response to trust is more emotional than rational. Therefore, while it is possible in theory to distinguish doctors' competence from their caring or honesty, in fact patients tend to regard all of these personal attributes the same, either high or low.

Sample questions used in the survey instrument developed at Wake Forest University are shown in the Table. Observe how strongly worded some of these questions are. One might assume that no patient would strongly agree to statements like "Your doctor only thinks about what is best for you," but in fact most patients are so highly trusting that it is difficult to develop measurement tools that can distinguish levels of trust. On a scale from 1 to 5, the average trust score is 4 or higher. Patients generally do trust their doctors.

Uniformly high responses to trust questions may be an artifact of the survey approach. Patients may not want their doctors to know that they think badly of them, or respondents may just give the answers they think the researchers want to hear. On the other hand, it seems very likely that most patients are highly trusting of their doctors, at least in part because, if they find themselves with a doctor whom they don't trust, they move on to another doctor. And patients trust because trusting is a psychological need—a way for patients to cope with the intense anxiety and vulnerability they feel when ill.

Whether doctors deserve the level of trust that they receive brings us to the question of trustworthiness. Much of medical ethics, law, and public policy seeks to ensure that doctors operate in ways that make them deserving of trust, and to prevent or punish abuses of trust. It is important to distinguish these normative issues from the purely empirical study of trust itself.

Determinants of Trust

Beyond studying what trust is and measuring levels of trust, we need to know more about the factors that affect trust and what difference trust makes. Predictors of trust can be divided into three groups: patient factors, doctor factors, and relationship factors.

Patient factors. It is somewhat surprising to learn that most patient characteristics (age, gender, race, education, and income) are *not* strongly associated with trust.⁷ Some studies have found some of these factors to be weakly correlated with trust, but the correlations are not of great magnitude and not consistent across studies. In our research, we found that even medical workers, who one might think have the greatest reasons to be cynical, are just as or even slightly more trusting than lay people. Especially notable is the finding that patients' general level of trust (or cynicism) about society at large and people in general is *not* associated with their level of trust in doctors.^{6,8} In other words, trust in medical caregivers appears to be unrelated to particular patient personalities or other psychological factors. Instead, trust appears to be very much a product of the particular doctor-patient interaction.

Doctor factors. As was the case with patients, physicians' age, gender, race, specialty, and board certification are not strongly associated with whether they are trusted.⁷ These non-associations hold up whether the characteristics of doctors are matched or contrasted with those of patients. It is important to note, however, that many of these factors have not been studied in great depth, and in many studies sample sizes are not large enough to draw firm conclusions about sub-populations or special conditions.

A number of doctor-related factors *are* significant predictors of trust. The strongest of these are the doctor's communication skills and bedside manner.⁷ For instance, we found that doctors who appear to be confident in their medical decisions engender more trust. Patients who reported having fewer disputes with doctors reported higher levels of trust, although it is not clear whether more trust leads to fewer disputes or *vice versa*. Not having to wait too long for an appointment helps with trust, as it does with all other aspects of the doctor-patient relationship.⁹

Relationship factors. The length of the professional relationship, having had a choice in selecting a doctor, and making that choice based on knowledge and information about the doctor rather than selecting from a list of unknowns are important predictors of trust.⁹ Interestingly, continuity in the relationship rather than its duration in time or number of visits is not strongly predictive of trust.¹⁰ In other words, once patients know their doctors well, they do not necessarily have to see the same doctor at each visit in order to maintain the

level of trust. This suggests that at least some types of delegated care do not damage trust.

However, a number of aspects of managed care plans do hurt trust. First, managed care plans that restrict an enrollee's choice of doctor lower trust.¹¹ Second, plans that pay their doctors by capitation have less trusting patients,⁵ although this may reflect more the style of medical practice or the nature of the professional relationships than it does patients' views about financial incentives, *per se*. At Wake Forest University, I directed a randomized trial in which we tested trust levels before and after members of a managed care plan were told how their doctors were paid. Compared with a control group, getting information about possible financial conflict of interest did not change trust in the doctors or in the health plan. Once again, trust appeared to depend more on global characteristics of the relationship than on discrete pieces of information.

The Value of Trust

To date, only a few studies have looked at the effect of trust on various patient behaviors and attitudes, but these few reveal a number of important insights: patients who trust more are more satisfied with care, feel better just by seeing the doctor even if they are still sick, are more willing to recommend the doctor to others, are more willing to forgive any medical mistakes, and are more adherent to treatment plans.⁷ Patients with higher levels of trust are less anxious during treatment, less interested in switching doctors, and less inclined to seek second opinions.^{9,10}

Some presumed relationships of trust to patient behavior and attitude have not been corroborated in the initial round of studies. For instance, patients' desire or willingness to seek care is not strongly related to trust, nor is their preferred role in medical decision making.⁷ It appears that trust can be compatible with both a deferential (or paternalistic) doctor-patient relationship and with a more shared or full-participation model.

Our understanding of trust is only in its infancy, and the studies of trust done so far have a number of limitations. They have looked only at relatively healthy, primary-care populations, rather than at the chronically or acutely ill or other specialized populations. Most studies have relied entirely on self-reported patient attitudes and behaviors rather than on objectively observed measures. Only a few studies are longitudinal in design, and therefore allow us to draw only limited inferences about causal relationships.

A topic as important, complex, and potentially paradoxical as trust requires extensive and rigorous evaluation in order to fully understand its dimensions, attributes, and consequences. It is my hope that future efforts will allow us to better understand the central and fundamental role of trust, and to devise ways to improve and sustain trust.

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Commentary

I am never so humbled or touched as when my patients trust me. Professor Hall's study of trust of doctors by patients examines a most basic phenomenon in the care of the ill. Such an examination has been criticized arguing that trust is either "there" or "not there" and should not be subjected to deconstruction. Professor Hall confirms that trust is largely a "single, global factor" rather than divisible into separate elements.

The study of trust is critical to understanding and perhaps the very existence of the role of physician. A technology explosion dominates medicine. It is widely implied that simple delivery of this current and future technology is fully sufficient to constitute a new medicine. Those who care for the sick daily know that this view is not adequate and leads to the sense that "something is missing."

Hall notes many important aspects including the tremendous vulnerability of the person as patient and the strong level of trust in populations studied. He makes a timely distinction between trust and satisfaction. His initial results are intriguing and I look forward to his detailed publications.

I take issue, however, with Hall's suggestion that trustworthiness can be ensured by external constraints of formalized ethics, law, and public policy. I believe that the ethical dimension of trust—full commitment to the patient's welfare above all else—is fundamentally important and that it must come from within the physician and the profession rather than primarily through external sanctions and monitoring. External constraints can never engender the level of trustworthiness required for medical care.

We must be aware that the trust that patients report and that we perceive—and perhaps even measure—may be a surrogate, a manifestation of deeper phenomena in the physician patient relationship and the experience of illness. These elements may be so deep in the area of human vulnerability that verbal descriptions can only approximate them. Often they are the stuff of stories.

There is a final and perhaps most important caveat. We live in an age of image creation and manipulation. Health care is, to some, an economic commodity. Advertisers are adept at maintaining a semblance of trust in, for example, brand names that are no longer connected to the very individuals, organizations, or values that originally proved trustworthy. As we study trust we must be aware that a physician *appearing* trustworthy (perhaps by using certain communication skills or behavioral training) may not necessarily subscribe to the ethical dimension of trust to put the patient first—the mark of the *profession* versus the technical act of medicine. In aspiring to merit our patient's trust we would do well to remember the motto of our state: *esse quam videri*—"to be rather than to seem." Trustworthiness begins with us.

—Conrad Fulkerson, MD

When Medical Meets Spiritual

Yi-Kong Keung, MBBS, FACP, and Richard McQuellon, PhD

Human beings have complex personal, psychological, sociological, and spiritual dimensions. The spiritual dimension deals with the essence of what lies "beyond the physical or biological being of a person," with what is closely related to the human search for the meaning and purpose of life.

What is the meaning of life? What is death? Is there a God? Is there a life after death? Answers to these questions have been a quest of humankind from the beginnings of history. Today we may be more technologically advanced, but are we more *spiritually* advanced than our ancestors?

Importance of Spirituality in Medicine

Doctors have always been more than "human body mechanics," and spirituality has always been an integral part of medical care. In ancient times, doctor and priest were one, and the same person cared for both body and soul. According to the recent Gallup poll, 94% of Americans believe in God or a Higher Power.¹ In a similar vein, 79% of US family doctors reported a strong religious or spiritual orientation.² Nearly two-thirds of people would like their doctors to talk to them about spirituality or pray with them.³⁻⁶ We find these statistics consistent with our own everyday patient encounters—nearly all of our patients appreciate it when we bring up spiritual issues.

We find it helpful to imagine what it will be like as we lie on our dying beds. What will come to our minds as the most important things in our lives? We doubt it will be the money, property, or prestigious titles that we have accumulated. More likely, we will call to mind something related to love, family or eternity. No wonder, then, that spirituality is important to the practice of medicine.

Spirituality and Health Outcomes

In the midst of rapid technological advancements—the widely publicized Genome Project, gene therapy, cell and

animal cloning, for example—has come an increased emphasis on the spiritual in medicine. We searched MEDLINE for published papers containing the keywords "spirituality" or "prayer." Figure 1 shows the virtually exponential increase in the number of such papers over the past 30 years.

In recent years, researchers have investigated the relationship between health and religious behavior or spirituality. McBride et al reported that patients who scored higher on ratings of spirituality had better overall health.⁷ Koenig et al reported that greater intrinsic religiosity shortened the time to remission for patients with major depression.⁸ Or maybe it's the other way around. Thomas et al reported that critically ill patients had a greater sense of purpose in life than non-critically ill patients or healthy controls.⁹ Chronically ill or terminal patients have significantly higher levels of spiritual well-being.^{10,11} Two double-blind, randomized studies have found that intercessory prayer was correlated with fewer adverse events and better clinical outcomes for patients admitted to coronary care units.^{12,13}

Limitations of Spirituality Studies

Even studies of spirituality that are methodologically sound have limitations. They should be interpreted with caution and the conclusions not extrapolated beyond the study context.¹⁴ One difficulty in comparing studies is the different meanings assigned to "spirituality" by different people. It is a term that is hard to define precisely, so making direct comparison among studies is difficult.¹⁵ There are also differences between religious behavior and spirituality. Payne argues that intrinsic differences in religious beliefs may make it inappropriate to lump patients of different religion backgrounds together in a study.¹⁶

Not only is it difficult to define spirituality, it is difficult to measure and quantify it. Arbitrary scoring of measurement scales for spirituality, overall health, and health outcomes compounds the problem of interpreting these studies.¹⁷ For

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example, how can you decide when patients with hypertension are healthier than those with depression, and vice versa? The problems of difficult-to-interpret results are exemplified by several studies. Some show that sicker patients tend to be more spiritual,⁹⁻¹¹ and others show that more spiritual patients have better overall health or better response to therapy.^{7,8} Does spirituality improve health, or does bad health or clinical outcome lead to increased spirituality? The answer is open to speculation. It may be that as patients get sicker, they become more spiritual. In any case, correlation should not be confused with causation.

The effects of prayer are also controversial.^{18,19} Is it possible to have a genuine "control" group? Someone, in some remote village, who prays generously for sick people all over the world may, in theory, upset the design of randomized trials of intercessory prayer. Another problem relates to the notion of qualitative difference among different prayers by different persons. Are heartfelt prayers recited by spouses into the ears of patients qualitatively more significant than prayers of strangers in remote areas? It seems almost impossible to control these variables.

Limitations do not imply that studies of spirituality are unnecessary or irrelevant. Knowing the limitations helps us interpret the studies correctly and contextually, and lets us apply the results more appropriately. It should be emphasized that the importance of spirituality in medical practice was established before there were any data suggesting correlations to health outcome. Spiritual care is important because we care about our patients as whole persons.

Spirituality and Medical Education

Though important, only recently have the spiritual aspects of patient care been taught in medical schools.^{20,21} Perhaps the practice of medicine is the best curriculum for learning about the importance of spirituality in people's lives. According to a recent study, doctors who had practiced for 20 years were

more open to communicating with terminally ill patients and their families about death and dying.²² Today, many medical schools incorporate religious and spiritual issues into their curriculums and residency programs.^{21,23,24} At Wake Forest University School of Medicine, issues of spirituality and end-of-life care are taught, together with medical ethics and legal medicine, in lectures and group tutorials given during the first two years of school.

End-of-life care is a topic routinely incorporated into continuing education programs like the annual meetings of American College of Physicians and the American Society of Clinical Oncology. In this era of medical specialization, even doctors who feel too busy to provide emotional and spiritual

counseling themselves, can always designate qualified professionals—pastoral counselors, social workers, clinical psychologists—who can offer guidance.

Spiritual Care: Personal Sharing

According to different religious traditions, life ends in one of three "Rs": recycling, reincarnation, or resurrection. Atheists believe that life ends and then the body's components recycle. Buddhists and adherents to

Eastern religions hold that after life ends the spirit is reincarnated into new generations of life forms. Christians, Jews, and Muslims believe that life ends with the hope of eternal life.

Providing spiritual support to dying patients can inspire hope and help them deal with their impending death, within the framework of their own religious beliefs.²⁵ Suffering ceases in some way at the moment it becomes meaningful.²⁶ Some patients have obvious difficulties in relating their suffering to their own beliefs. They become depressed and ask for help; we should address their spiritual needs as much as we treat their medical problems. We can report from our personal experience that taking an active role in the spiritual counseling of patients is very rewarding. In the process, we also learn the inevitable lesson: "Be prepared because you, like the patient, will eventually lie on a hospital bed."

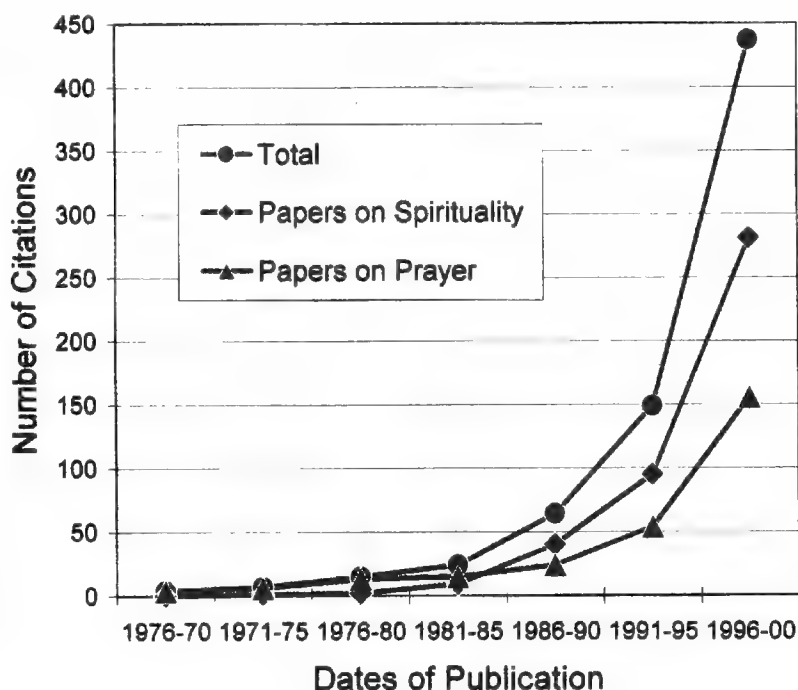


Figure 1. Exponential growth of literature on "spirituality" and "prayer"

To those I love and who love me.
 When I am gone, release me. Let me go.
 I have so many things to see and do.
 You mustn't tie yourself to me with tears.
 I gave to you my love. You can only guess
 how much you gave me in happiness.
 Thank you for the love you each have shown,
 but now it's time I travel on alone.
 So grieve a while for me, if grieve you must
 then let your grief be comforted by trust.
 It's only for a time that we must part.
 So bless the memories within your heart.
 I won't be far away. Life goes on.
 So if you need me, call and I will come.
 Though you can't see or touch me, I'll be near
 and if you listen with your heart, you'll hear
 all my love around you, soft and clear.
 And then when you must come this way alone,
 I'll greet you with a smile and say,
 welcome home.

Figure 2. From a headstone in a cemetery in Dallas, Texas.

What are the desirable outcomes of spiritual care? Prolonged survival? Fewer adverse events in the coronary care units? If one defines spirituality as closeness to God, then the outcomes probably transcend biological measurement. The desired outcomes are more likely to be qualitative ones like joy, tranquility, or inner peace despite the deterioration of the physical body (Figure 2). Ultimately, these transcendent states may help patients reach the final stage of acceptance of the inevitable,²⁷ of "Thy will be done." They may also help families to accept what is coming, and encourage mutual forgiveness within the family. One Sunday the preacher said, "Prayers seldom change reality. However, they almost always change our hearts." This is the true value of prayer. It has the power to change our hearts if not our broken bodies.

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Spirituality—*Cum Grano Salis*: A Commentary

The article by Drs. Keung and McQuellon in this issue of the *Journal*¹ reminds us again that doctors should pay attention to the spiritual life of the patients they treat. Twenty-four hundred years ago, in ancient Greece, Plato staked out the territory pretty clearly when he said:

I dare say that you have heard eminent physicians say to a patient who comes to them with bad eyes, that they cannot cure his eyes by themselves, but that if his eyes are to be cured, his head must be treated; and then again they say that to think of curing the head alone, and not the rest of the body also, is the height of folly. And arguing in this way they apply their methods to the whole body, and try to treat and heal the whole and the part together. . .

. . . I learned [these lessons] when serving with the army from one of the physicians of the Thracian king Zamolxis, who . . . told me that. . . 'as you ought not to attempt to cure the eyes without the head, or the head without the body, so neither ought you to attempt to cure the body without the soul; and this,' he said, 'is the reason why the cure of many diseases is unknown to the physicians of Greece, because they are ignorant of the whole, which ought to be studied also; for the part can never be well unless the whole is well.' For all good and evil, whether in the body or in human nature, originates, as he declared, in the soul, and overflows from thence, as if from the head into the eyes. And therefore if the head and body are to be well, you must begin by curing the soul; that is the first thing. And the cure . . . has to be effected by the use of certain charms, and these charms are fair words; and by them temperance is implanted in the soul, and where temperance is, there health is speedily imparted, not only to the head, but to the whole body. And he who taught me the cure and the charm at the same time added a special direction: 'Let no one,' he said, 'persuade you to cure the head, until he has first given you his soul to be cured by the charm. For this,' he said, 'is the great error of our day in the treatment of the human body, that physicians separate the soul from the body.'²

It seems to me that Plato and Keung and McQuellon make the same argument: that true healing requires attention to the spiritual facets of patients' lives, and that doctors ignore the importance of the spiritual at their great peril (although I am not sure *exactly* what Plato was talking about when he used the word that Professor Jowett translates for us as "soul"). In the arguments they set forth, Plato and Keung and McQuellon clearly take the side of the angels. I suppose it is true that patients appreciate and respond when doctors pay attention to their spiritual lives, and I think they feel a sense of bond when they assume (or presume) that their doctors share spiritual and religious creeds with them^{3/4} but does healing depend on this? I know there is *testimony* about the importance of the spiritual in medical practice, but we have been talking about this for two and a half millennia or more, and where is the *evidence* that it makes a difference?

Science might help us here, but designing appropriate studies is enormously difficult (what is the appropriate placebo control for attending to spirituality? ignoring or belittling spirituality? being oblivious to the spiritual dimensions of persons' lives?). Some of the studies that have been tried seem to me ludicrous—for example, randomized trials of anonymous, intercessory prayer. The underlying assumption seems to be that God wants to talk to humans, and used to know Hebrew, but has forgotten and nowadays can only speak mathematical statistics. Harry Houdini couldn't talk to us from the other side of the grave, and the telephone in Mary Baker Eddy's tomb has not rung, but t-tests will tell us whether God is listening? Please! Hubris, the recurring sin of humankind, continues, supported by wishful thinking and money from foundations and governments.

If I am skeptical about whether attention to the *spiritual* is really different from attention to any other of the many personal aspects of peoples' lives, I do not want to suggest that failure to attend to the personal won't make a difference. To ignore patients' personal lives is to be—or at least seem to be—callous and indifferent, to not care. And if, as Francis Weld Peabody said, the "secret of the care of the patient is in caring for the patient,"³ then even seeming to not care will undermine our positions as doctors. I don't want to do that. So I will listen carefully to the arguments of Plato and Keung and McQuellon and their successors, and hope that another two centuries of centuries will bring the lens of science to sharp focus on this problem.

—Francis A. Neelon, MD

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This is the day we discovered the ocean.

And I learned jellyfish aren't made of jelly.

And my brother laughed so hard he swallowed the sea.

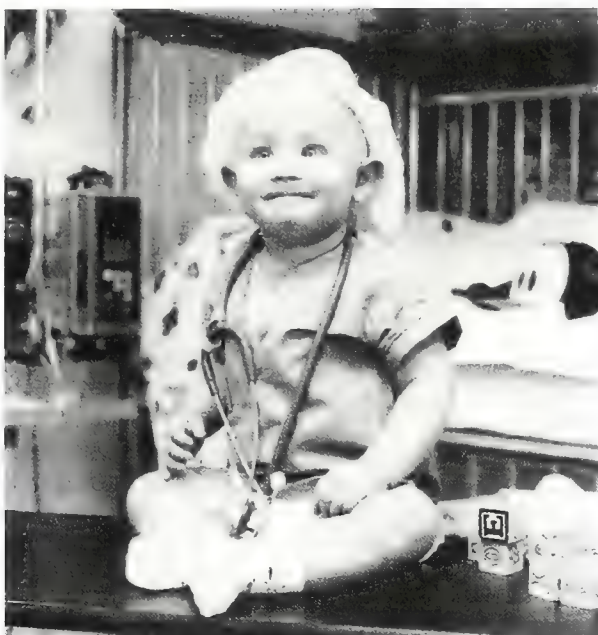


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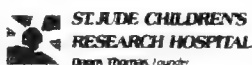
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Helicobacter Pylori

A View From a Primary Care Perspective

Mrugeshkumar K. Shah, MD, MPH, MS, Stephanie H. Shah, MD, and Parinda K. Fruchtman, MD

In 1893, *Helicobacter pylori* (*H. pylori*) was found on the gastric mucosa of dogs.¹ At the time, the significance of this discovery was overlooked, because attempts to culture the organism were unsuccessful and because it was believed that the acidic environment of the stomach was too harsh to permit long-term bacterial colonization. However, in 1983 Marshall and Warren grew Gram-negative, spiral-shaped bacteria from gastric biopsies of humans.^{2,3} This was the first time living *H. pylori* had been cultured from the stomach (*H. pylori* can also be found in the duodenum).

Epidemiology

Some studies estimate that over half of the world's population—and about 30% of the US population—is infected with *H. pylori*.^{1,4} It is difficult to determine the exact prevalence because so many individuals are asymptomatic or self-treat their symptoms with over-the-counter medications. In the US, there are regional differences in the prevalence of *H. pylori* infection: it is higher in the Northeast and lower in the South and West.⁵ There are also ethnic variations in prevalence: it is higher in blacks and Hispanics and lower in whites^{6,7} (the cause of racial and ethnic differences is not well understood). Some studies indicate a 5–20% higher prevalence in men than in women,⁸ but this figure is controversial since other studies have shown equal prevalence of antibodies to *H. pylori* in both men and women.⁹ What is not controversial is the increasing prevalence of infection age.¹⁰ The prevalence is <10% in people <40 years of age and rises to >50% in those >50 years.^{11,12} Cross sectional studies imply that infection with *H. pylori* begins during childhood. The annual rate of infection has been estimated at 0.4% for adults,¹³ and it may be higher in children.

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Low socioeconomic status and low levels of education are associated with *H. pylori* infection.^{9,14} Alcohol use and smoking have not been clearly implicated, but some studies demonstrate a weak link.⁵ A genetic predisposition has been suggested;⁸ studies of *H. pylori* infection concordance in monozygotic and dizygotic twins show that heritability may explain more than half of infection prevalence.¹⁵ The mode of transmission of *H. pylori* is still uncertain, but oral-oral, gastro-oral, and fecal-oral routes are all possible.^{16–18}

Symptoms

Patients infected with *H. pylori* often complain of dyspepsia. Common presenting symptoms include epigastric pain, postprandial fullness, nausea, or vomiting (or both). Patients may also describe gastroesophageal reflux, heartburn, and chest pain. At times individuals present with complications of peptic ulcer disease, including abdominal pain after eating. There are conflicting data on whether patients' symptoms correlate with *H. pylori* infection; some studies say yes,^{19,20} others say no.^{21,22}

Consequences of Infection

H. pylori infection has been thought to cause or predispose to duodenal and gastric ulcers, gastric adenocarcinoma, gastritis, and gastric lymphoma.¹⁰ Other suggested but uncommon associations are non-ulcer dyspepsia, coronary artery disease, Barrett's esophagus, inflammatory bowel disease, and bronchiectasis,^{23,24} but the link between these diseases and *H. pylori* infection is weak at best.

Peptic Ulcer Disease. A number of studies show that duodenal and gastric ulcers are associated with *H. pylori* infection (up to 90% of duodenal ulcers and 70% of gastric ulcers in one study,²⁵ but others studies show rates of association as low as 20% – 50%^{26–28}).

Table 1. Tests used to diagnose *Helicobacter pylori* infection*

	Sensitivity	Specificity	Comments
Noninvasive tests			
Serologic	70-100%	62-100%	quick and easy; not good for monitoring treatment
Breath test	92%	95%	easy; special equipment required
Invasive tests			
Histology	93%	98%	expensive; requires two sample sites to be reliable
Culture	92%	100%	expensive; not widely available; takes time
Tissue Urease	89%	98%	expensive

*Modified from Pezzi and Shiao¹ and Laheij et al³³

Chronic gastritis. Chronic gastritis is associated with *H. pylori* infection, but the mechanism by which this happens is not fully understood. Only 30-50% of patients with gastritis test positive for *H. pylori*.¹ *H. pylori* is suspected of causing the mucosal injury that leads to chronic gastritis,¹ but the association may be fortuitous because the prevalence of *H. pylori* infection in patients with gastritis is not substantially higher than in the general public.

Gastric adenocarcinoma. Worldwide, up to 55% of gastric adenocarcinoma has been ascribed to *H. pylori* infection.⁴ The highest rates of stomach cancer are found in areas where the rates of *H. pylori* infection are high (China, Japan, Scotland, and Peru). In New Orleans, 70% of blacks are *H. pylori* positive and the rate of gastric cancer is high in this population.²⁹ However, the development of gastric cancer must be multifactorial, because about 30% of the US population is infected with *H. pylori* but gastric cancer affects less than 1%.¹

Non-ulcer dyspepsia. Non-ulcer dyspepsia refers to localized pain in the upper abdomen for which no structural cause can be demonstrated on clinical evaluation or testing.³⁰ *H. pylori* infects fewer than half of persons with non-ulcer dyspepsia.³¹ Since dyspepsia can occur without *H. pylori* infection and infection can occur without symptoms, it seems unlikely that *H. pylori* has a strong causal relationship to non-ulcer dyspepsia.

Diagnosis

H. pylori infection can be diagnosed by noninvasive or invasive methods (Table 1). One noninvasive method (the serologic tests) determines the presence of IgA or IgG serum antibodies against *H. pylori*. Most of these tests rely on an enzyme-linked immunoabsorbent (ELISA) or on a latex agglutination assay; a positive result implies a present (or at least recent) infection. Another noninvasive test, the breath test, takes advantage of the fact that *H. pylori* produces the

enzyme urease. Isotopically labeled urea, swallowed by the patient, is cleaved by this enzyme to release labeled carbon dioxide, which can be measured in the exhaled breath. Noninvasive tests require special equipment but are inexpensive and easy for the patient, and the results can be obtained rapidly.³²

Invasive methods rely on analysis of samples obtained during endoscopy. They include measurement of tissue urease and histologic identification or microbiological culture of *H. pylori* from biopsy specimens. These tests are more difficult to perform and usually more expensive than noninvasive tests. The tissue urease test works on the same principle as the breath test but uses samples obtained at endoscopy. Histologic identification of *H. pylori* or its culture from tissue samples both take relatively long times to complete.³²

Treatment

There are a number of regimens available for the treatment of *H. pylori* infection. The standard treatment has been triple drug therapy with a bismuth compound (typically Pepto-Bismol), tetracycline, and metronidazole, usually given in conjunction with a H₂ receptor blocker. Amoxicillin can be substituted for either tetracycline, bismuth, or metronidazole. Another regimen uses omeprazole with either amoxicillin or clarithromycin. Generally, two weeks of treatment are recommended to eradicate *H. pylori*.¹ The regimen used in our office has been metronidazole (500mg twice daily for 14 days), clarithromycin (500mg twice daily for 14 days), and omeprazole (20mg twice daily for 30 days).

A Look at Our Clinic

We retrospectively reviewed medical charts of patients attending a family practice office in rural North Carolina. Information regarding the patients' *H. pylori* status was obtained from the office computer database using the Cur

Table 2. Ethnic and gender distribution of study population

	White	Black	Asian	Hispanic	NA*	Total
Men	15	3	2	1	1	22
Women	26	19	3	2	5	55
Total	41	22	5	3	6	77

*not available

rent Procedure Terminology (CPT) code for *H. pylori* serologic testing. Tests were performed using *Flexpak HP* (Abbott Laboratories), which has a reported sensitivity of 70% and specificity of 100% for detecting *H. pylori* infection.³³ We also generated a list of patients bearing diagnoses for peptic ulcer or gastroesophageal reflux disease because, since symptoms in these two conditions overlap, we wanted to minimize the possibility of missing patients who had been tested. The diagnosis list was cross referenced to the *H. pylori* test list, and the patients' charts examined.

Seventy-seven charts were available and reviewed to determine the patient's age, race, sex, comorbid conditions, risk factors (cigarette smoking, alcohol use), diagnosis of ulcer, results of *H. pylori* serologic test, and symptoms. The data were entered into the INSTAT computer program, and analyzed using the t-test, chi-square test, and Fisher test; a *p* value of ≤ 0.05 was considered significant.

Results

Characteristics of the Study Group. The mean age for the study group was 45 ± 16 years (mean \pm SD); 55 (71%) were women (age range: 14–76 years), and 22 (29%) were men (age range: 13–79 years). The t-test showed no statistical difference in the age distribution of men and women. Data on ethnicity were available on 71 of 77 subjects; 58% were white, 31% black, 7% Asian, and 4% Hispanic (Table 2).

Distribution of *H. pylori* seropositivity. Forty-one of the 77 patients (53%) had positive serological tests for *H. pylori*. Those with positive tests were significantly older than those with negative test (50.9 versus 36.8 years old, $p < 0.001$). The difference in positivity between men and women was not significant ($p = 0.08$); but it was between ethnic groups (Table 3). Compared to non-whites, a smaller percentage of whites tested positive for *H. pylori*.

Risk Factors, Symptoms, Comorbidity. Risk factors for peptic ulcer disease and *H. pylori* infection were assessed in the sample population, using the Fisher test (Table 3). Patients with a positive test for *H. pylori* were more likely to have a history of peptic ulcer disease ($p = 0.01$), but not more likely

to use alcohol or tobacco. Patients with positive serological tests were also more likely to have diagnosed hypertension or hypercholesterolemia, but not depression or esophageal reflux. Symptoms of heartburn (found in 45% of our patients), abdominal pain associated with meals (19%), epigastric pain (20%), and chest pain, nausea, or vomiting (16%) were not significantly associated with *H. pylori* positivity.

Discussion

Noninvasive testing for *H. pylori* infection in patients with symptoms of dyspepsia is becoming more routine. Serologic testing is a convenient, quick, and inexpensive path to diagnosis. Commercially available kits allow primary care physicians to test (and treat) infected patients.

Our analysis of our practice confirms previous data as to which patients are likely to have a positive *H. pylori* test. Our seropositive patients tended to be older than seronegative patients, in line with the data of Dooley et al, and Perez-Perez et al, both of whom showed increased positivity in older patients.^{11,12}

Patients who were seropositive were more likely to have had a peptic ulcer. The National Institutes of Health Consensus Development Panel affirmed the link between ulcers and *H. pylori*, and concluded that eliminating *H. pylori* decreased the rate of ulcer recurrence.¹

Some studies⁸ have found that men have a higher rate of *H. pylori* infection, but others show rates for men and women to be equal.⁹ We found no significant difference in seropositivity between men and women. Studies have shown a higher prevalence of infection in blacks and Hispanics in the United States.^{6–8} Few of our cases were Asian or Hispanic, but all of those tested were positive (Table 3). We do not have data on the ethnic distribution of our clinic that would allow us to calculate prevalence rates, but it may be significant that 39% of whites and 59% of blacks tested positive, compared to 100% of Asians and Hispanics.

Comorbid conditions such as coronary artery disease and hypertension have been weakly associated with infection.^{9,10} We found that more of our seropositive patients than seronegative patients had hypertension or hypercholesterolemia, but the reason for this association is unclear. In accord with our findings, the literature shows an association of seropositivity with ulcer but not with gastroesophageal reflux.^{1,26,27}

No strong conclusions should be drawn from our study because of its small size and the fact that patients seen in the office may not be representative of the general population. Another limitation is the 70% sensitivity of the *H. pylori* test used. This implies that up to 30 % of seronegative patients were actually infected; misclassifying these patients may have

Table 3. Distribution of *Helicobacter pylori* seropositivity

	Number	H.pylori positive	H.pylori negative	p value*
Gender				0.08
Male	22	8 (36%)	14 (64%)	
Female	55	33 (60%)	22 (40%)	
Ethnicity				
White	41	16 (39%)	25 (61%)	<0.025
Black	22	13 (59%)	9 (31%)	ns
Asian	4	4 (100%)	0 (0%)	<0.05
Hispanic	3	3 (100%)	0 (0%)	ns
Comorbid conditions				
History of ulcer	22	17 (77%)	5 (23%)	<0.01
Hypertension	26	21 (81%)	5 (19%)	<0.001
Hypercholesterolemia	23	18 (78%)	5 (22%)	<0.01
Alcohol use	7	4 (57%)	3 (43%)	ns
Tobacco use	27	12 (44%)	15 (56%)	ns
Depression	25	11 (44%)	14 (56%)	ns
Esophageal reflux	19	7 (37%)	12 (63%)	
Symptoms				
Heartburn	60	34 (57%)	26 (43%)	ns
Post-prandial pain	25	15 (60%)	10 (40%)	ns
Epigastric pain	26	12 (46%)	14 (54%)	ns
Chest pain	11	7 (64%)	4 (36%)	ns
Nausea/Vomiting	10	4 (40%)	6 (60%)	ns

*Calculated by chi-square test; for ethnicity, tested as group vs. nongroup (e.g., white vs. nonwhite, Asian vs. non-Asian); ns = not significant by chi-square test or by Fisher exact test.

skewed some of the conclusions in the study. In an ideal situation, we would have compared test results to the gold standard of endoscopy and biopsy, but this was not feasible. Still, our results do correlate with a good deal of what is found in the literature. Testing patients of advancing age and with a history of ulcer will identify patients with infection and to allow them to be treated appropriately.

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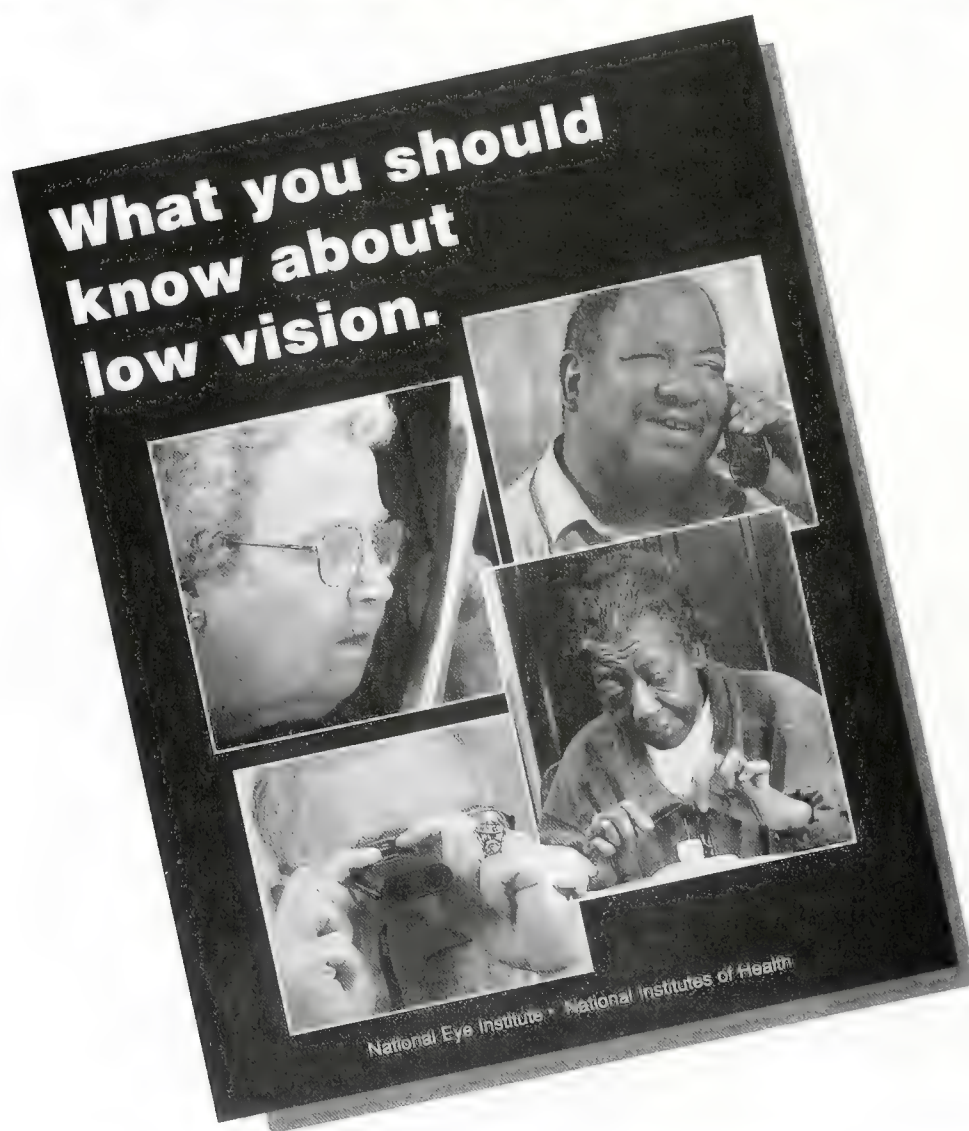


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Videolaparoscopy in General Surgery

An Update

Venkatachala I. Sreenivas, MD, FACS, and Viswanadham Pothula, MD, FACS

The introduction of antiseptics, anesthesia, and antibiotics left indelible marks on the practice of surgery. To the above list we now need to add the videoscopic techniques that have affected all branches of surgery. In this paper we offer an update on how videoscopic techniques have influenced general surgery.

Historical Background

Laparoscopy began in 1901 when Kelling¹ used a Nietz cystoscope to visualize the viscera of a dog. Eight years later Jacobeauss¹ reported the use of laparoscopy to diagnose tuberculosis, cirrhosis, cancer, and syphilis in humans. In Germany following World War I, limited resources made laparoscopy a popular diagnostic procedure because of the shorter hospital stays it required.

The move from diagnostic to therapeutic laparoscopy was slow. In 1933, Fervers¹ used a laparoscope to lyse adhesions, and at about the same time gynecologists began to perform laparoscopic tubal ligations. In 1960s and 1970s, the following developments increased the safety and enlarged the scope of laparoscopy: (1) the development of a rod-lens system that increased light transmission 80-fold; (2) use of cold light transmission to decrease the risk of burns; (3) the development of an automatic gas insufflator to distend the abdomen; and (4) insertion of canulas under direct vision. Finally, in 1985, introduction of solid-state image sensors (miniature videocameras) allowed capture of laparoscopic images on a videomonitor. This made it possible for multiple persons to visualize the image simultaneously and brought therapeutic laparoscopy into the main stream of general surgery.

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In 1988, the first US laparoscopic cholecystectomy was performed.² General surgeons quickly recognized the potential benefits of laparoscopic surgery and began using the technique to treat other abdominal conditions.

Pros and Cons of Laparoscopic Surgery

Laparoscopic procedures are usually performed with instruments measuring 5 to 10 mm in diameter. This means less pain and better cosmetic results than with open laparotomy. Patients leave the hospital and resume normal activities sooner than those who undergo open surgical procedures.

Laparoscopic procedures require a large number of expensive instruments, and they take longer to perform. These factors lead to increased costs, which may be offset by shorter hospital stay and early return to work.

Laparoscopic Procedures

The Table lists procedures that have been successfully performed laparoscopically. Just a few years ago many of these procedures required open laparotomy. Now, the question often facing a surgeon is not whether a procedure *could* be done laparoscopically but rather whether it *should* be done laparoscopically. The decision is not always easy, and it requires attention to safety as well as to costs.

Cholecystectomy: Laparoscopic cholecystectomy has become the standard treatment for gallstones. It is safe, has a brief (or no) associated hospital stay, and permits early return to normal activities.³ The short hospital stay and early return to work make this procedure cost effective.⁴

Exploration of the common bile duct for stones: The best way to remove stones from the common bile is still uncertain. There

Table. Procedures successfully performed by laparoscopy

I. Diagnostic
Staging of malignancy
Evaluation of blunt and penetrating injuries
Inflammatory conditions of abdomen
II. Therapeutic
Biliary System
Cholecystectomy
Common bile duct exploration
Biliary-enteric anastomosis
Gastric procedures
Gastrostomy
Jejunostomy
Nissen funduplication
Vagotomy
Gastrectomy
Gastric restrictive procedures for obesity
Vertically banded gastroplasty
Roux-en-Y gastric bypass
Adjustable gastric banding
Repair of hernia
Diaphragmatic hernia
Inguinal hernia
Ventral hernia
Hollow organ resection
Appendectomy
Colon resection
Solid organ resection
Splenectomy
Adrenalectomy
Distal pancreatectomy
Liver resection
Enucleation of lesions
Wedge resection
Anterior segmentectomy
Left lateral segmentectomy
Lysis of adhesions for relief of small bowel obstruction

are three options available: (1) pre- or post- cholecystectomy endoscopic section of the Sphincter of Oddi for stone retrieval; (2) removal of stones (through the cystic duct stump or by choledochotomy) at the time of cholecystectomy; and (3) open exploration of the common duct. Treatment should be planned to clear the common duct of stones with the least morbidity, the fewest procedures, and in the shortest possible time.

Biliary and intestinal bypass: Patients with unresectable malignant obstruction of the distal bile duct require palliative anastomosis of the biliary tree to the intestine (cholecystojejunostomy or choledochojejunostomy). Other

patients may need gastrojejunostomy to relieve gastric outlet obstruction. Laparoscopic cholecystojejunostomy or gastrojejunostomy are safe, and the length of hospital stay and duration of palliation compare favorably to open procedures.⁵

Gastrostomy and jejunostomy: Percutaneous endoscopic gastrostomy is the procedure of choice for patients needing a feeding tube. When this is not feasible, laparoscopic gastrostomy may be considered. For patients in whom gastrostomy is contraindicated, laparoscopic jejunostomy can be considered. Both are relatively new procedures so there are no meaningful data regarding outcome or cost.

Nissen funduplication: Laparoscopic Nissen funduplication (or a modified operation) very effectively treats gastroesophageal reflux.⁶ The procedure is safe, hospital stay is short, and the patient returns to work early. When the procedure is successful, the patient is freed from a lifetime of having to take medications, thus leading to substantial cost savings.⁷

Vagotomy: It is now uncommon to recommend surgical treatment of peptic ulcer. As a result, there is too little experience with selective vagotomy to draw meaningful conclusions about its cost savings or long-term results.

Gastrectomy: The development of laparoscopic stapling devices and entrapment sacks have made it feasible to treat peptic ulcer disease and benign gastric tumors laparoscopically. Laparoscopic resection of malignant tumors is still controversial.

Gastric operations for obesity: Three laparoscopic procedures are used in the treatment of obesity. All create a restricted-volume upper compartment in the stomach to produce early satiety. The procedures used are: (1) vertical banded gastroplasty (VBG), (2) Roux-en-Y gastric bypass (RYGB), and (3) adjustable gastric banding (AGB). In VBG (Figure 1a) the small upper compartment of the stomach empties through a restricted stoma into the distal stomach. In RYGB (Figure 1b) the upper compartment is completely shut off from the rest of the stomach and is anastomosed to a limb of the jejunum. In AGB an adjustable silicone band is used to create a small proximal compartment. A jacket surrounding the band is connected to a subcutaneous or subfascial reservoir (Figure 1c). Weight change is regulated by injecting saline into or aspirating it from the reservoir to increase or decrease the size of lumen connecting proximal and distal compartments of the stomach. AGB is the least invasive and most completely

reversible of the three procedures. These laparoscopic procedures produce comparable weight loss, and are less painful and expensive than open procedures.⁸ The duration of hospital stay and convalescence are short.⁸

Inguinal hernia: The indications for choosing laparoscopic repair of inguinal hernia have not been defined. It appears most helpful in patients with bilateral and recurrent hernias,⁹ and it may be indicated in patients who have to resume vigorous physical activity shortly after the operation. Rate of hernia recurrence is similar to open procedures,¹⁰ but costs are higher. The cost to society may be less because of early return to work.¹¹

Ventral hernia: Post-operative incisional hernia is a serious complication of laparotomy, and occurs in about 10% of cases.¹² Open repair has a high incidence of recurrence (40% when the hernia is >4 cms in diameter, and 25% when the hernia is ≤4 cm¹³). Laparoscopic repair using dual-surface, expanded polytetrafluoroethylene mesh is an attractive alternative to open repair because of the low incidence of complications and recurrence.¹⁴ The mesh is placed on the peritoneal surface over the hernia and the edge of the mesh is anchored to the abdominal wall at least 4 cm beyond the margin of the hernia defect (Figure 2).

Appendectomy: General surgeons have not enthusiastically embraced laparoscopic appendectomy. The potential benefits (small incision; short hospital stay; early return to work) have not been clearly proven.¹⁵ Use of the laparoscope does have an advantage of avoiding open operation when the diagnosis is uncertain, as in young women of child bearing age who may be pregnant, or in obese patients in whom physical findings are difficult to interpret.

Colorectal surgery: Colon resection and anastomosis may be performed exclusively from within the bowel or as a laparoscopic-assisted procedure. In the latter situation, the anastomosis is performed through a minilaparotomy. Endoscopic anastomosis has been greatly facilitated by improved endoscopic intestinal staplers.

Colon resection for diverticulitis is safe and produces shorter hospital stays and a brief convalescence.^{16,17} The reported advantage of laparoscopic colectomy for resection in sigmoid diverticulitis may more be the result of patient selection than the technique.¹⁸

Laparoscopic resection of potentially curable colon cancer is controversial. The length of colon resected and the number of lymph nodes retrieved by laparoscopy compare well to the open procedure. However, we await the results of an ongoing, randomized prospective trial to address the all-important issues of cancer recurrence and survival. There is controversy as to whether laparoscopy leads to metastatic deposits at the port-site. Allendorf et al¹⁹ showed that, in

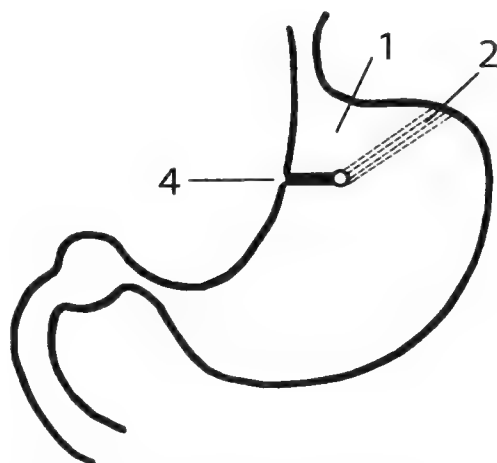


Figure 1a. Vertical banded gastroplasty

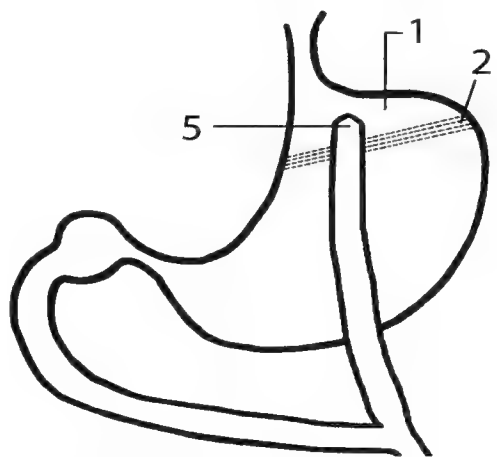


Figure 1b. Roux-en-Y gastric bypass

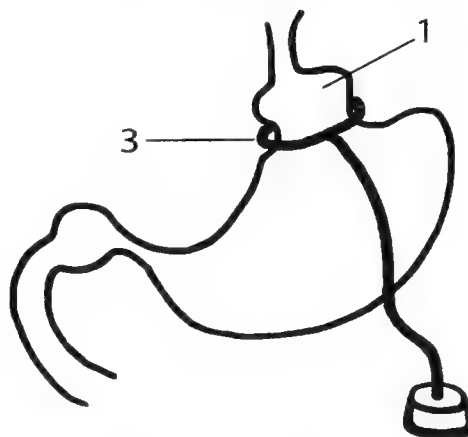


Figure 1c. Adjustable silicone gastric band

Figure 1a-c. Three gastric restrictive procedures for obesity. 1 = Small proximal compartment; 2 = Staple line separating the two compartments; 3 = Adjustable gastric band; 4 = Restricted stoma between the two compartments; 5 = Gastrojejunal anastomosis

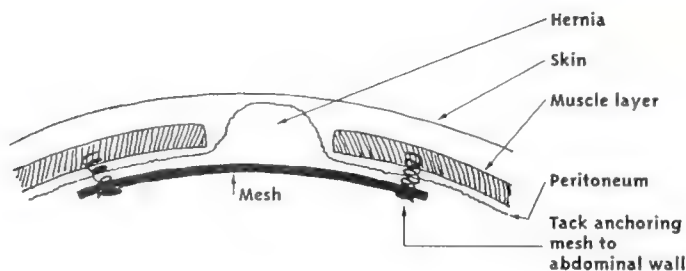


Figure 2. Cross sectional view of repair of incisional hernia

animals, laparoscopy had an immunologic advantage over laparotomy. The reported incidence of peritoneal metastasis ("seeding") after laparoscopy ranges between 1 and 21%.²⁰ In animals, trocar wounds were five times more likely than laparotomy wounds to develop metastases,²¹ but the mechanism of increased risk is not known. One study found that gasless laparoscopy (see below) produced an incidence of port-site metastasis similar to that of laparotomy.²² It is possible that carbon dioxide insufflation disseminates tumor cells, which coat the trocar and are then implanted.

Splenectomy: Experience with laparoscopic splenectomy is limited. No advantage over the conventional procedure has yet been established, but hospitalization after uncomplicated laparoscopic splenectomy lasts 2 to 3 days, so there are potential cost savings.²³

Adrenalectomy: Laparoscopic adrenalectomy is indicated in patients with functional adrenal tumors <6 cm in diameter. Laparoscopic adrenalectomy appears equivalent in cost to open, posterior adrenalectomy, and somewhat less expensive than open transabdominal procedures.²⁴

Distal pancreatectomy: Laparoscopic distal pancreatectomy is technically difficult. Operation time is prolonged, and we do not presently have enough data to recommend laparoscopic distal pancreatectomy over open procedure.

Liver resection: Enucleation of liver lesions, wedge resection, and anterior and left lateral liver segment resections have been done laparoscopically. There are not enough data to recommend routine use of laparoscopy for liver resections.

Lysis of adhesions for relief of bowel obstruction: Adhesive bands causing small bowel obstruction are amenable to laparoscopic lysis.²⁵ Bowel distention proximal to the point of obstruction may make it difficult to see the lesion.

Miscellaneous: Laparoscopy has been used to triage patients with blunt or penetrating abdominal trauma. Data indicate that avoiding laparotomy in patients who have not suffered

intra-abdominal injury shortens hospital stays. It is, of course, important to be absolutely sure that no injury has been overlooked.

The Developmental Horizon

Further miniaturization of instruments. We can expect that 2-3 mm trocars and instruments now being developed will soon replace the 5-10 mm instruments presently in use.^{27,28} Smaller instruments will facilitate performance of procedures in some patients and will decrease pain. In critically ill patients, bedside exploration under local anesthesia may become possible.

Gasless laparoscopy: It is possible to perform laparoscopic procedures without induction of a pressurized pneumoperitoneum. Operating space within the abdomen is obtained by lifting the abdominal wall with a mechanical device.²⁹ This technique eliminates complications associated with induction and maintenance of positive pressure pneumoperitoneum. In gas insufflated laparoscopy, visualization may be interrupted by leaking gas, but this does not happen with gasless laparoscopy.²⁹ Gasless laparoscopy permits use of the same instruments employed in open procedures, thereby decreasing the "learning curve" and making the procedure easier to perform.²⁹

Pneumatic sleeve: One disadvantage of laparoscopic surgery is that the surgeon cannot directly palpate the structures. A pneumatic sleeve eliminates this disadvantage. The surgeon's non-dominant hand, surrounded by a pneumosleeve, is introduced into the abdomen through a small incision. The closed sleeve mechanism is attached to the abdominal wall, and maintains the pneumoperitoneum, while facilitating palpation, retraction and mobilization of structures under laparoscopic vision.³⁰

Conclusion

This is an exciting time in surgery. The techniques, instruments, and indications for laparoscopic procedures are still evolving. It is conceivable that future procedures will be performed with fewer port-sites and with smaller caliber instruments, thereby decreasing pain and suffering to the patient. Surgery is entering an era of reduced invasiveness.

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* 70% higher mortality in a 9 year follow up period for people getting 6 hours of sleep or less per night. Wingard D.L., Berkman L.E., Mortality risk associated with sleeping pattern. *Sleep*, 1983; 6(2): 102.

Two Neurosurgeons

A Bond between Nicaragua and North Carolina

William G. Sullivan, MD

Our medical group of seven passed easily through Immigration and Customs. Shortly thereafter, we drove through the still-ruined center of Managua (never rebuilt after the New Year's Eve earthquake of 1972), and headed north to Leon, 100 kilometers away. The highway runs parallel to the Pacific Coast, but 15 miles inland, under the shadow of a row of active volcanoes lining a valley of cattle ranches and sugar cane plantations. White puff clouds blew across the deep blue sky; it was balmy and dry. Cars, trucks, bicycles, oxcarts, and men on horseback all traveled the same two-lane highway. The many bridges washed out by the floods of hurricane Mitch in November 1998 had all been replaced.

Our four companions went straight to their lodgings, but Dr. Stephen Boone, neurosurgeon, Lori McLeod (my daughter and a Spanish teacher), and I went directly to Hospital Rosales. A large number of North Carolina's medical people have visited Leon in the 15 years since Raleigh cardiologist John Paar began the association between this Nicaraguan hospital and WakeMed, but this was the first visit by a neurosurgeon. Dr. Nerio Cabrera, a 57-year-old, Mexican-trained neurosurgeon, was there in white shirt, white trousers, and white shoes to greet his North American colleague.

We began rounds immediately after the greetings. Lori and I translated for these two men with common, deeply held interests in patient care, but no common tongue. Of course, we were helped by the fact that much of communication is non-verbal, and much of medical nomenclature has common Latin roots. Dr. Cabrera presented his patients clearly and thoroughly, so that much of what he said needed no translation. It appeared to me that an instant rapport was estab-

lished, each man identifying in his colleague complete devotion to patient care and to their shared specialty.

The wards were dimly lit, but pleasantly cool from the afternoon breeze that filtered through the open windows. There were several beds in each room. Plain x-ray films and—on a few occasions—CT scans were stored under the mattresses, whence they could be retrieved and viewed through the light from the windows. There is no computed tomographic scanner in Leon, home of one of the two medical schools in country. Patients from Hospital Rosales must travel to Managua to get a head CT scan—for \$200 US!

The first patient we saw was a small, 16-year-old boy with intermittent, severe headaches. His CT scan showed a 3.5 cm intraventricular tumor. Dr. Cabrera was reluctant to operate on this patient with the facilities available in Leon, and Dr. Boone agreed, so immediately after rounds letters were prepared soliciting a US Visa so that the boy could come to Raleigh for surgery. We also asked for help from the administration of Wake Medical Center, which has underwritten the support of occasional patients who could not have surgery in Leon.

Then we saw an 8-year-old boy with a cerebral malformation, encephalomalacia, and hemorrhage; a 54-year-old woman with a left temporal meningioma; and an 18-year-old man with a chronic subdural hematoma (Drs. Boone and Cabrera subsequently and successfully resected the lesions of all three patients). We saw a 21-year-old woman with a stroke (a cerebral aneurysm was suspected but had not been confirmed radiographically); a 60-year-old-man with paraparesis from an intramedullary tumor of the mid-thoracic spine; and a middle-aged man with fever, intermittent disorientation, and hemiparesis. The two neurosurgeons thought tuberculous meningitis was likely in the latter case, but the diagnosis had not been proved. A young mother from the mountains 100 miles away held a newborn paraplegic infant with huge teratoma of the lower back.

When I arose each morning at 5:30 to start my day with Mass at the church around the corner, I would find Dr.

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Dr. José Cruz, Dr. Nerio Cabrera, Dr. Stephen Boone, and Dr. William Sullivan

Boone sitting at the side of his bed, planning his workday in a field that demands concentration and is unforgiving of errors. After the first three craniotomies went smoothly and successfully, and fearing delay in the young man with the intraventricular tumor, Dr. Boone decided to operate on the day before our scheduled departure. The surgery went well, and the lesion proved to be an intraventricular ependymoma. Unfortunately, the anesthesiologist decided to "protect" his patient by giving a large dose (2 grams) of barbiturate without telling Dr. Boone of his plan. On the afternoon of surgery, the patient remained unresponsive on the ventilator, and Dr. Boone was quite worried. Fortunately, when we made rounds on the morning of departure, we found the patient extubated and reactive. Subsequently, we learned by telephone of his complete recovery.

On the Sunday during our week-long visit, our host drove us out to see the volcanoes. The collapse of the inactive *Las Casitas* volcano in November 1998 had created a mudslide that killed 1500-2000 people, and left a crater lake and what seemed to be a ski trail in brown, scarring the face of the mountain. The locals say that a wall of mud, roaring down at 30 miles an hour, covered the 3-plus miles to Poselttega in six minutes. On our last night in Leon we sat in an open, thatched-roofed restaurant on the beach. As the sun set over the

Pacific, Nicaraguans and Norteamericanos shared *Cerveza Victoria*, and the best fried fish that any of us had ever tasted.

Four months after our visit, Dr. Cabrera made a reciprocal visit to Raleigh, observing the work of Dr. Boone in the operating room, the NICU, the wards, and the office. Over the month of his visit, he had a chance to observe an extremely busy neurosurgical schedule, and the OR nurses did themselves proud in the welcome they provided—including putting together a "Care Package" of rongeurs, forceps, retractors, bipolar forceps, shunt paraphernalia, and hemostatic material for Dr. Cabrera to take home. At the dinner reception, in his deliberate Spanish, he expressed his gratitude for the opportunity to work in Raleigh, learning how to improve the care of his patients.

As an older general surgeon, I am left with enormous pride in my profession and in my colleagues. I saw first hand the generous gifts of time and talent and interest made by our doctors, and especially by our neurosurgeon, Steve Boone. I saw a capable and dedicated Nicaraguan neurosurgeon overcome severe material limitations to provide the best possible care for his patients. I am left thankful for the warm professional friendships we formed, and for the chance to see, in person, the breathtaking beauty of Nicaragua.

How Close Is North Carolina to Meeting Medicare's Clinical Priorities?

Meera Kelley, MD, Jill McArdle, MSPH, RN, Robert Weiser, Ross Simpson, Jr., MD, PhD

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The authors assume full responsibility for the accuracy and completeness of the ideas presented. This article is a direct result of the Health Care Quality Improvement Program initiated by the Health Care Financing Administration, which has encouraged identification of quality improvement projects derived from analysis of patterns of care, and therefore required no special funding on the part of this contractor. Ideas and contributions to the author concerning experience in engaging with issues presented are welcomed.

Our elderly face significant threats to their well-being. Among these threats are pneumonia, myocardial infarction (MI), congestive heart failure (CHF), stroke, diabetes mellitus, and breast cancer. Large clinical trials have identified keys to the care and prevention of each of these conditions, and they have been published in consensus guidelines. An assessment of the quality of care for these conditions was recently published in JAMA.¹ We supply here our assessment of the care for each condition in North Carolina, and a description of ongoing and future efforts to improve quality of care.

Background

Measuring and improving the quality of healthcare is increasingly important to care providers, payers, and consumers, but it has been a tremendously complex and challenging

task to find consistent, efficient ways to approach this worthy goal. Until now, we have had only limited success in developing nationally applicable methods to do this on a consistent basis.² However, the Health Care Financing Administration (HCFA) recently launched an unprecedented endeavor that allows across-states comparisons of healthcare quality under fee-for-service Medicare.

Medical Review of North Carolina, Inc. (MRNC) is a private, not-for-profit, physician sponsored, federally designated Peer Review/Quality Improvement Organization (PRO/QIO). There is a PRO/QIO for each state, the District of Columbia and the US territories; MRNC has been the PRO/QIO in North Carolina since 1984. Under contract with HCFA, the federal agency that administers the Medicare program, MRNC monitors and seeks to improve the quality of care of North Carolina's Medicare beneficiaries. In 1994, HCFA required PRO/QIOs to stop the traditional approach to quality improvement (utilization review through retrospective medical record audit) and instead developed a Health Care Quality Improvement Program (HCQIP).

HCQIP uses a collaborative, non-regulatory approach to analyze and change the processes of care, and thereby to improve outcomes and remedy shortcomings in the healthcare system.³ Collaboration, which is critical to the success of

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Table. North Carolina Medicare beneficiaries receiving indicated care

Disorders and care indicators	NC beneficiaries receiving care	Range	Nationwide rank
Pneumonia (Inpatient)			
- Appropriate antibiotics	81.4%	54.9%-87.1%	12
- Antibiotic given within 8 hours	83.7%	38.4%-92.8%	32
- Blood culture before giving antibiotics	78.8%	65.2%-93.4%	42
- Influenza vaccination	19.0%	5.9%-39.2%	17
- Pneumococcus vaccination	11.9%	3.5%-26.1%	25
Acute Myocardial Infarction (Inpatient)			
- Aspirin at discharge	89.6%	59.8%-96.0%	8
- Beta blocker at discharge	79.5%	46.7%-92.7%	10
- ACE-Inhibitor at discharge	77.0%	56.8%-90.0%	11
- Aspirin at admission	81.7%	65.3%-96.6%	36
- Beta blocker at admission	65.3%	32.5%-80.3%	23
- Counseling to stop smoking	34.6%	19.4%-70.2%	39
- Median time to thrombolytic therapy	52 min	21 min-66 min	42
- Median time to PTCA*	108 min	50 min-559 min	22
Heart Failure (Inpatient)			
- Patients not on ACE-I* or ARB* who had left ventricle function tested in hospital	71.0%	33.7%-78.6%	13
- Patients with left ventricle dysfunction discharged on ACE-I*	79.1%	46.8%-90.9%	6
Stroke (Inpatient)			
- Discharged on antithrombotic medication	87.0%	72.0%-90.1%	7
- Not given sublingual nifedipine	96.9%	86.2%-100.0%	18
Atrial Fibrillation (Inpatient)			
- Discharged on warfarin	60.2%	30.7%-65.3%	9
Pneumonia ¹ (Outpatient)			
- Outpatient influenza vaccination	64.6%	41.5%-74.5%	33
- Outpatient pneumococcus vaccination	50.6%	32.2%-59.4%	14
Diabetes Mellitus ² (Outpatient)			
- Annual hemoglobin A1c test	73.2%	41.2%-85.3%	20
- Biennial dilated eye exam	71.9%	54.1%-79.7%	18
- Biennial lipid testing	55.2%	38.9%-72.7%	33
Mammography ³ (Outpatient)			
Biennial screening mammogram	56.8%	45.3%-65.6%	20

*PTCA = Percutaneous transluminal coronary angioplasty; ACE-I = Angiotensin converting enzyme inhibitor; ARB = Angiotensin receptor blocker.

¹ Rates derived from 1997 Behavioral Risk Factor Surveillance System (MMWR Oct. 2, 1998).

² Service dates: 07/97 – 06/99 (N= 71,575).

³ Service dates: 01/97 – 06/99 (N=118,511 non-HMO women aged 52–69 yrs).

HCQIP, means forming partnerships with practitioners, beneficiaries, hospitals and other providers, plans and other purchasers to

- (1) identify scientifically valid quality indicators (measurable aspects of care);
- (2) identify ways to improve care based on the measurement of care processes;
- (3) communicate with health care providers about these care processes;
- (4) improve the quality of care by improving care-delivery systems;
- (5) continuously evaluate degree of success and modify improvement efforts appropriately.

In 1999, HCFA (through its contracting PRO/QIOs) began working to improve care in six specific clinical areas. Previously, PRO/QIOs had been free to choose clinical topics, as long as they met objectives set by HCFA. The national effort to improve care in particular clinical areas is expected to standardize the care given to fee-for-service Medicare beneficiaries. As part of this effort, HCFA has published statewide performance data for 24 quality indicators associated with the six national clinical topics.¹ These same indicators will be re-measured in two years, after PRO/QIOs have worked with hospitals, providers and beneficiaries to improve quality of care.

The national healthcare quality improvement topics and indicators were selected on the basis of their clinical importance to the Medicare population, on PRO/QIOs' experience in working with the topics, on evidence of need for improvement, and in the belief that quality improvement efforts would succeed. The selected conditions and topics were the following:

- (1) treatment and prevention of pneumonia;
- (2) acute myocardial infarction (AMI);
- (3) heart failure (HF);
- (4) stroke; transient ischemic attack (TIA); atrial fibrillation;
- (5) breast cancer;
- (6) diabetes mellitus.

Details regarding specifications and the scientific evidence supporting these choices are available at <http://www.hcfa.gov/quality/11a.htm>.

Methods

To gather baseline data for each hospital-based topic (pneumonia, AMI, heart failure, and stroke/TIA/atrial fibrillation) each state submitted 750-800 hospital records of fee-for-service Medicare beneficiaries (96.5% of Medicare enrollees in NC used fee-for-service in 1998, and 95.4% in 1999). Medical records of patients who had an appropriate diagnosis listed on a claim and who had been hospitalized between October 1998 and March 1999 were selected via a

systematic random sample. All North Carolina hospitals with discharge diagnoses that met established selection criteria were included. The medical records were reviewed at a Clinical Data Abstraction Center under contract to HCFA. Pertinent data regarding each of the quality indicators were collected using established validity and reliability standards.

The 1997 Behavioral Risk Factor Surveillance System (BRFSS) of the Centers for Disease Control and Prevention provided data on outpatient pneumococcal and influenza vaccination. The BRFSS, a random telephone survey of non-institutionalized adults, determines self-reported immunization status. Rate estimates exclude those younger than 65 years but do include individuals enrolled in managed care.⁴

Data from paid claims for Medicare Part A (inpatient) and Medicare Part B (outpatient) from July 1997 through June 1999 were used to derive values for the diabetes quality indicators. The target population was all fee-for-service Medicare beneficiaries, aged 18-75 years, who had one inpatient or two outpatient claims citing a diagnosis of diabetes mellitus.

Paid claims data for Medicare Part A and Medicare Part B from January 1997 through December 1998 were used to derive rates for screening mammography. All women aged 52-69 years who were enrolled in Medicare in 1997 and 1998 were the target group.

Patients with a documented reason contraindicating the application of a quality indicator were excluded from evaluation (for example, patients with pneumonia and allergy to recommended antibiotics). Therefore, ideal performance rates on all indicators should be approximately 100%.

Results

Baseline measurements are shown in the Table. Compliance with a specific quality indicator is shown as the percentage of eligible patients whose chart or claims data gave evidence of compliance, except in the cases of reperfusion via Percutaneous Transluminal Coronary Angioplasty (PTCA) or infusion of thrombolytic agents for AMI; those results are displayed as the median number of minutes from arrival at hospital to beginning of angioplasty or infusion. For comparison, the range of compliance across the nation is also given. The final column shows North Carolina's rank for each indicator compared to the other 49 states, the District of Columbia and Puerto Rico. The lower the ranking, the better the care: 1 means that state was the best of the 50 states and two territories; 52 means it was worst.

Overall, taking the average rank of each state on 22 performance measures (excluding PTCA and thrombolytic therapy), North Carolina ranked 17th in the nation. Compliance rates in NC ranged from a low of 11.9% (for vaccination against pneumococcus of pneumonia inpatients) to a high of 96.9% (for avoiding sublingual nifedipine in stroke patients).

North Carolina's national rankings were best for use of angiotensin converting enzyme inhibitors (ACE-I) in HF (Rank = 6) and for prescription of antithrombotic drugs for stroke prevention (Rank = 7); they were worst for delay in starting thrombolytic therapy (Rank = 42), getting diagnostic blood cultures in pneumonia patients (Rank = 42), and for advising AMI patients to stop smoking (Rank = 39).

Discussion

North Carolina's national rank of 17 placed us first in the Southeast and first among states with large Medicare populations. Despite this overall good performance, North Carolina's particular strengths and weaknesses in various clinical topics warrant more detailed consideration.

Pneumonia. Appropriate antibiotics were used in 81.4% of the surveyed medical records (national rank = 12). This may seem like a reasonable compliance rate, but considerably higher levels are achievable, especially given the large number of therapeutic choices given in current guidelines.⁵⁻⁶ Antibiotic choice is particularly important because of increasing antibiotic resistance in *Streptococcus pneumoniae* (pneumococcus) and the potential role of *Legionella* in severely ill patients. Antibiotics were given within 8 hours in 83.7% of reviewed cases (rank = 32). Timely use of antibiotics is associated with a significantly lower 30-day mortality,⁷⁻⁹ and near 100% compliance should be attainable.

It is particularly important today to culture blood for bacteria before starting antibiotics because of the increasing likelihood of encountering resistant pathogens and because of the significantly lower yield of blood cultures taken after antibiotics have been started. Drawing blood cultures within 24 hours of arrival in hospital is associated with a lower 30-day mortality and is recommended by the American Thoracic Society and the Infectious Diseases Society of America in their guidelines for management of community-acquired pneumonia.^{5-6,9} Forty-one states performed better than NC in obtaining blood cultures prior to antibiotic administration, giving us significant margin for improvement.

Finally, only 11.9% and 19.0% of records showed evidence of screening inpatients for or administering pneumococcal and influenza vaccination, respectively. Similarly low rates are found across the nation, so improvement in vaccination is a significant national public health priority.¹⁰⁻¹² A number of studies have demonstrated the efficacy and safety of vaccinating hospitalized patients.^{4,13-20}

Acute Myocardial Infarction. Early use of aspirin lowers mortality in AMI patients by 23%.²¹ Despite this significant benefit—and the advertisement of its importance directly to the public—early aspirin use was noted in only 81.7% of the reviewed records of AMI patients (rank = 36). Use of beta

adrenergic blockers within 24 hours reduces short-term mortality, but only 65.3% of AMI patients were treated (rank = 23).²² Long-term use of aspirin and beta blockade is also associated with reduced mortality, and aspirin with reduced non-fatal MI and stroke.²²⁻²³ Fortunately, 89.6% and 79.5% of AMI patients reviewed were discharged on aspirin and beta blockers, making NC one of the national leaders (rank = 8 and 10 in these categories).

Timely reperfusion of injured myocardium improves survival in AMI.²⁴⁻²⁵ In NC the 50th percentiles for time to PTCA and use of thrombolytic therapy were 108 and 52 minutes, respectively (rank = 22 and 42, respectively). There is significant room for improvement.

Long-term use of ACE-I can reduce mortality by 20-27%.²² in patients whose left ventricular ejection fraction is impaired after myocardial infarction. Our national ranking of 11 is encouraging, but the fact that long-term ACE-I was used in only 77% of eligible cases leaves significant room for improvement.

Finally, counseling patients to stop smoking after AMI decreases mortality; patients who quit smoking have mortality rates that are 25-60% lower than patients who don't quit.²⁶ Yet in only 34.6% of medical records was there evidence of counseling to stop smoking. Thirty-eight states performed better than NC on this indicator.

Heart Failure. The guidelines of the American Heart Association, American College of Cardiology, and the Agency for Health Care Policy and Research all make use of ACE-I the cornerstone of therapy in patients with heart failure due to systolic dysfunction (left ventricular ejection fraction usually <35%-40%).^{22,27} ACE-I was prescribed at discharge in 79.1% of the reviewed records of patients admitted with heart failure. This ranks NC as a leader in the United States (rank = 6).

Atrial Fibrillation. Anticoagulation of patients with nonvalvular atrial fibrillation reduces the risk of stroke by 52-86%; the annual rate of stroke is decreased from 4.5% in control patients to 1.4% in patients treated with warfarin.²⁸⁻³³ NC ranked 9th in the country, but the rate of use at discharge was only 60.2%; there is considerable room for improvement—in NC and in the rest of the US.

Stroke/Transient Ischemic Attack. Rapidly acting antihypertensives like sublingual nifedipine may drop blood pressure precipitously, leading to further tissue damage in patients with ischemic stroke; based on a number of reports of severe hypotension, AMI, conduction disturbance, and death, this drug should be avoided.³⁴⁻³⁵ Fortunately, 96.9% of the records reviewed showed no evidence of such drugs being prescribed in this setting. Furthermore, 87% of stroke/TIA patients were discharged on aspirin or other antiplatelet agents, again making NC a national leader (rank = 7).

Diabetes Mellitus. The benefits of intensive therapy to control blood glucose in patients with Types 1 and 2 diabetes are well established.³⁶⁻³⁷ To assess the level of glucose control, diabetic patients should have their hemoglobin A1c (HbA1c) levels measured every 3-12 months (depending on known or suspected degree of glucose control). In NC, HbA1c had been measured during the preceding year in 73.2% of diabetic subjects, ranking NC at number 20 in the nation.

High levels of blood lipids (cholesterol and triglycerides) are modifiable risk factors for macrovascular disease, a leading cause of death in diabetes.³⁸⁻³⁹ NC ranked 33rd on this indicator (only 55.2% of patients had evidence of biennial lipid measurement).

Finally, eye examinations by an ophthalmological expert are recommended to detect and allow treatment of diabetic retinopathy, and thereby prevent or reduce visual impairment.⁴⁰ Medicare claims data indicate that 71.9% of beneficiaries with diabetes had a biennial exam (rank = 18).

Breast cancer. Regular screening mammograms can reduce breast cancer mortality in women aged 50 and older by 20-40%; they can prevent approximately one-fourth of breast cancer deaths.⁴¹ Survival rate is correlated significantly with stage of disease at the time of detection.⁴² The biennial mammography rate among women in NC age 52-69 was only 56.8% (rank = 20). It is essential to remind patients that Medicare will pay for screening mammography in covered women over 50 years of age.

Current Directions

North Carolina performed best in topics related to heart failure and stroke. This may be due in part to the fact that MRNC had worked with North Carolina hospitals and doctors on these two topics in the years preceding the baseline measurements. MRNC plans to work with NC hospitals, providers and consumers to further improve the patient care related to these and to all six targeted clinical topics.

In February 2000, MRNC began developing and implementing strategies to increase North Carolina's performance on the Medicare quality indicators. The general intervention to increase rates of compliance with the indicator standards takes the form of educational efforts, directed at North Carolina's 114 acute care hospitals, to outline Medicare's national clinical topic priorities and the inclusion/exclusion criteria associated with each of the quality indicators.

Specific interventions have been targeted toward indicators for which improvement appeared possible, for example, those on which NC scored lower than other states, or those for which providers felt increased efforts would yield considerable results, or those associated with known improvement approaches that could be transferred to and adopted by the NC healthcare community. MRNC, working collaboratively with NC's hospitals and practitioners, wants to make it as easy as possible to deliver quality care, and wants to help beneficiaries understand what constitutes quality care. Various organizations with similar healthcare quality improvement goals have been recruited as partners to work on the targeted quality indicators. We summarize here MRNC's efforts thus far.

"Specific interventions have been targeted toward indicators for which improvement appeared possible, for example, those on which NC scored lower than other states, or those for which providers felt increased efforts would yield considerable results, or those associated with known improvement approaches ..."

Pneumonia. In 2000, doctors, nurses, pharmacists, infection control professionals, and hospital quality improvement personnel from hospitals across North Carolina attended one of three regional seminars focused on improving care for pneumonia patients. Attendees received information on a number of quality indicators, including the use of standing order policies for immunizing inpatient adults. The NC Hospital Association, the NC Association of Pharmacists, the NC/SC chapter of the Association for Professionals in Infection Control and Epidemiology, and state physician groups helped develop the seminars and related improvement interventions. The first step was the distribution of an inpatient immunization toolkit that provided hospitals with the items needed to develop a pneumonia

quality improvement initiative. Laminated pocket reference cards citing the antibiotics recommended for treating community-acquired pneumonia were distributed to clinicians and members of the North Carolina College of Emergency Physicians.

In 2000, MRNC began its fifth year of service as co-chair (with the Division of Public Health) of the Senior Vaccination Season (SVS) Coalition. The Division of Public Health and MRNC help by distributing posters and patient education brochures to SVS coordinators in local health departments across the state. In partnership with Maxim Healthcare Services, MRNC offered flu and pneumonia immunizations at the NC State Fair. Jim Graham, honorary SVS chair and the longest-serving Commissioner of Agriculture in US history, received his flu vaccination at the fair.

In partnership with a variety of healthcare organizations, MRNC offered postage paid reminder cards and office toolkits designed to help NC doctors increase the number of patients immunized in their practices. Flu and pneumonia

immunization reminder cards were sent directly to NC Medicare beneficiaries.

AMI (1) Smoking Cessation for Hospitalized Patients. In September 2000, in a concerted effort to improve efforts at smoking cessation, hospitals across the state were invited to a telephone conference discussing the newly published United States Public Health Service (USPHS) Guidelines for Treating Tobacco Use and Dependence.⁴³ Medical and pharmacist opinion leaders encouraged hospitals to screen AMI patients for tobacco use, advise patients to quit smoking, and to help those attempting to quit.

A comprehensive smoking cessation toolkit, developed from a literature review and based on demonstrated effectiveness in improving counseling or cessation rates, was distributed to every NC hospital. It contained the new USPHS practice guidelines, a sample smoking cessation policy (in the form of a standing order to identify and counsel all patients who smoke), and provider and patient education materials.

(2) Early Beta Blocker Usage: A laminated poster giving the ACC/AHA's recommendations (including drug dosages and contraindications) for beta blockers was sent to all NC hospital Emergency Departments and Cardiac Care Units.

Heart Failure. A telephone conference call in November 2000 allowed NC hospitals and doctors caring for heart failure patients to discuss the Heart Failure Society of America's practice guidelines.⁴⁴ The call, led by the chair of the guideline committee, reviewed use of ACE inhibitors, the recommended treatment for heart failure, and complementary therapies.

Stroke. In January 2001, hospital quality improvement staff and doctors were invited to a telephone conference entitled *Preventing Strokes in patients with Atrial Fibrillation: A Review of Treatment Guidelines and Best Practices*. All hospitals received an information toolkit, with sample admission and discharge order sheets for atrial fibrillation patients, reference cards listing warfarin-drug interactions, a medical record abstraction tool for hospitals to use in self monitoring, suggested strategies to improve performance, medical record reminder stickers, and reference cards containing consensus recommendations about atrial fibrillation.

Diabetes. (1) CheckPoints and CheckMates. CheckPoints is a doctor's office diabetes flowsheet and reminder guide based on the American Diabetes Association standards of care. CheckPoints and CheckMate (a companion, patient-oriented pocket card) were sent to all North Carolina Medicare fee-for-service primary care providers, and Medicare and Medicaid managed care primary care providers. CheckPoints and CheckMate can be downloaded or ordered free from MRNC's website.

(2) Promoting Eye Examinations. To improve the rate of

dilated eye exam for Medicare beneficiaries with diabetes, MRNC formed the North Carolina Collaboration for Detection and Treatment of Diabetic Eye Disease. This coalition of organizations is committed to improving eye care of persons with diabetes. As a first step, the NC coalition put in place a national eye initiative, designed by HCFA, the American Academy of Ophthalmology and the American Optometric Association, to link qualifying beneficiaries with providers of free or reduced fee comprehensive eye exams.

Disadvantaged Populations. In October 2000, MRNC sponsored the first African-American Alliance Summit, aimed at reducing the disparate care of African-American Medicare beneficiaries with diabetes in North Carolina. The summit promoted creation of an interactive network of individuals, organizations and agencies interested in and committed to improving the quality of health and healthcare for African-Americans with diabetes.

Breast Cancer/Mammography. The National Cancer Institute's Cancer Information Center, the Breast and Cervical Cancer Control Program, the American Cancer Society and the Susan G. Komen Foundation® joined MRNC in sponsoring *Bells for Remembrance*, a simple yet powerful way to promote breast health at community gatherings and religious services. Participants in a Bells for Remembrance community event or religious service are asked to ring a bell or observe a moment of silence three times to remember (1) the importance of screening for breast cancer; (2) those struggling with and surviving breast cancer; and (3) those lost to breast cancer and their families.

MRNC and the Professional Education workgroup of North Carolina's Breast and Cervical Cancer Control Coalition are pilot testing a physician reminder system in Wilmington, NC. The project provides doctor's offices with removable reminder stickers, which, when placed on a woman's medical record, will prompt the provider to schedule breast and cervical cancer screening. If successful, the system will be offered to doctors across the state.

Conclusions

MRNC has been charged with improving the care delivered to North Carolina's Medicare beneficiaries. To form the necessary partnerships among beneficiaries, providers, practitioners and health plans, MRNC seeks the commitment of the entire North Carolina healthcare community.

It is a matter of pride but little surprise that North Carolina ranked number one in the southeast in quality of care provided to Medicare beneficiaries. With four medical schools in the state, NC has a long tradition of excellence in training doctors and delivering health care. However, we should not and cannot rest on our national ranking of 17.

If all doctors would ensure that their own practices met the professional standards of care outlined in Medicare's quality indicators and if all would champion improvement efforts at the institutions with which they are affiliated, North Carolina will come a long way toward improving those rates. Anyone seeking additional information on the healthcare quality initiatives sponsored by MRNC is encouraged to call 919 851 2955 or see www.mrnc.org.

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A Breathless, Bloated Young Man

Superior Vena Cava Syndrome

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Compression or occlusion of the superior vena cava (SVC) leads to venous hypertension upstream from the occlusion. The result is a constellation of symptoms called the superior vena cava syndrome (SVCS). How a given patient presents depends on the rate of SVC closure and whether or not collateral circulation is present.^{1,2} The symptoms of venous hypertension in the head, neck, and arms include headache, fullness in the ears, difficulty swallowing, and coma.¹⁻⁴ In adults, the most common etiologies of SVCS are pulmonary and mediastinal malignancies, but in children most cases are iatrogenically induced.¹⁻⁴ Diagnosis is based upon clinical symptoms and is confirmed by radiographic studies.

We present here the case of a 20-year-old man who was evaluated three times over a six-week period before the diagnosis was made. The patient's clinical course, and the pertinent symptoms and signs illustrate key facets of the syndrome.

Our Patient

A 20-year-old man came to the emergency department (ED) complaining of upper respiratory symptoms for two weeks, and a productive cough for one. The patient said that for the previous three days "stressful events" had caused his head to "pulsate" for periods lasting about ten minutes. The head symptoms did not feel like a typical headache. He denied fever, chills, nausea, vomiting, diarrhea, or neurological symptoms.

His blood pressure was 164/86 mmHg; pulse, 100/min; respirations, 20/min; and oral temperature, 98.5°F (37°C).

He was alert and in no acute distress. Pertinent physical findings included a supple neck with mild adenopathy, and a clear pharynx. The ophthalmological, cardiac, pulmonary, abdominal, and neurological examinations were normal. Bronchitis and tension headache were suspected, and the patient was given a ten-day course of erythromycin. A resident physician suggested obtaining a chest radiograph, but the idea was "overruled" by the attending physician because the patient was afebrile, and the chest examination was normal.

Approximately one month later the patient returned to the ED complaining of continuing chest congestion and sputum production. He said that in the interim he had seen another doctor, who found no major medical problems, but the records were unavailable. He described new complaints of dyspnea on exertion, neck and facial swelling, puffy eyes, and a sensation of fullness with swallowing that had been present for one day. He admitted to malaise and generalized weakness over the previous two months, but otherwise the medical history was remarkable only for an unspecified allergy to bee and centipede stings.

His blood pressure was 122/96 mm Hg; pulse, 112 beats/min; respiration, 24 breaths/min; and oral temperature 98.4°F (36.9°C). Examination of the head, eyes, ears, nose, throat, heart, abdomen, and genitalia was normal. The neck was diffusely swollen and erythematous anteriorly. There was tenderness over the sternocleidomastoid muscles, but there was no adenopathy or nuchal rigidity. Auscultation of the chest revealed decreased breath sounds in the left base and mild wheezing in the right lung.

Gram's stain of sputum showed many white blood cells,

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a moderate number of squamous epithelial cells, and large number of bacteria compatible with mixed respiratory flora. His blood hemoglobin concentration was 12.3 gm/dL, with a mean corpuscular volume (MCV) of 81 fL. The white blood cell count was 10.9×10^9 cells/L, of which 78% were polymorphonuclear neutrophils, 7% band forms, 7% lymphs, 6% mononuclear cells, and 2% basophils. The platelet count was 630×10^9 /L. While breathing oxygen at 2 L/min via nasal cannula, his arterial pH was 7.44, pO_2 63, pCO_2 33, bicarbonate 22.9 and oxygen saturation of 92%.

Because of the patient's history of allergies, he was given 50 mg of diphenhydramine hydrochloride by intramuscular injection, but this did not relieve his symptoms. Based on his worsening symptoms, his pulmonary exam, sputum analysis, and hypoxemia, a chest radiograph was ordered. It demonstrated a huge anterior mediastinal mass with retrocaval, pretracheal adenopathy. The enlarged lymph nodes crossed the midline and displaced the aortic arch laterally and posteriorly. In addition, multiple parenchymal nodules, subsegmental atelectasis, and a small pleural effusion were noted in the left lower lung field. A diagnosis of SVCS was made.

Additional laboratory studies were normal save for a low cholesterol of 131 mg/dL and mildly elevated serum alkaline phosphatase and lactate dehydrogenase levels of 166 and 353, respectively. The patient was admitted to the oncology service and found to have an endodermal sinus tumor. He received chemotherapy including VP16, cisplatin, and bleomycin. He was discharged 35 days later for outpatient followup in the oncology clinic.

Discussion

SVCS can result from acute or sub-acute processes (thrombosis, compression, infiltration, or malignancy) that lead to obstruction of the SVC. In the past, up to 40% of SVCS cases were caused by tuberculosis or syphilis.² These causes are declining because of better diagnosis and treatment of the responsible infections. Today, retrosternal goiter, aortic aneurysm, thymoma, or pneumonia should be kept in mind as possible etiologies,⁹ but tumors account for 85–95% of cases of SVC obstruction (SVCS is seen in 3–8% of patients with lung cancers or lymphoma^{1,2,5}). Small-cell carcinoma of the lung is especially noteworthy; it causes 50% of all SVCS cases, although it accounts for only 25% of all lung cancers.² In contrast to adults, SVCS in children is usually iatrogenic.

Table 1. Causes of pediatric SVC syndrome*

	Patients
Cardiovascular surgery/iatrogenic	
Mustard's operation	41
Glenn procedure	6
Ventriculo-atrial shunt	42
Long-term SVC catheter	3
Non-iatrogenic	
mediastinal tumor	37
mediastinal granuloma	8
idiopathic thrombosis	2
congenital cardiovascular anomaly	4
hydrocephalus	1
local giant growth of the thecal bone	1
	145

*From Janin, Becker, Wise et al.¹¹

Table 2. Physical findings in adult patients with SVCS

	Armstrong et al ¹⁴	Chen et al ¹⁵	Markman ²
Facial edema	60%	78%	45%
Jugular venous distention	67%	27%	60%
Upper extremity edema	14%	75%	40%
Facial plethora	20%	13%	
Dyspnea	50%	71%	50%
Distention of thoracic veins	67%		
Cyanosis	13%		15%

Table 3. Physical findings in pediatric patients with SVCS

Finding	Ingram et al ¹⁶
cough/dyspnea	68%
dysphagia/orthopnea	63%
pleural effusion	50%
wheezing	31%
hoarseness	19%
pericardial effusion	19%
facial edema	12%
chest pain	6%

Janin, *et al*,¹¹ reported 145 children with SVCS; in 92 the syndrome followed cardiovascular surgery; in 37 of the remaining 53 patients, a mediastinal tumor was the cause (Table 1).

Venous drainage of the upper extremities and the head and neck occurs via the jugular and subclavian veins. These

empty, in turn, into the innominate veins and then into the SVC. The SVC is easily compressed by any of its bounding structures (trachea, heart, aorta, azygous vein, and lymph nodes). Yellin et al found that the duration of symptoms prior to seeking medical help was directly proportional to the rate of the SVC occlusion.¹⁷ A slowly developing obstruction of the SVC allows collateral channels to form; these mitigate and prolong the development of symptoms. On the other hand, rapid constriction of the SVC does not allow collateral circulation to develop, thereby leading to more severe and acute symptoms.^{1,2,10,11,17}

The path of collateralization depends upon the site of SVC compromise; obstruction above the orifice of the azygous vein diverts blood into the chest wall vessels and then into the azygous system.^{1,13} However, blockage at or below the orifice causes retrograde flow through the azygous vein and chest wall vessels to the inferior vena cava.^{1,10-13} The venous hypertension that develops may result in facial, upper extremity, or trunk swelling; tracheal edema; stridor; hoarseness; dyspnea, headache, lightheadedness, syncope, fullness in the ears, chest pain, or cyanosis.^{1-3,12,14-16,18} Table 2 lists symptoms found in three studies of SVCS.^{2,14,15} Ingram et al¹⁶ found cough, dyspnea, dysphagia, and orthopnea to be common symptoms in children (Table 3).

Chest radiographs reveal a mass in about 10% of patients; 75% are located in the right hemithorax, and a right-sided pleural effusion is also seen in 20-25% of patients.^{1,10,12} Patients who are acutely ill should be stabilized by head elevation and oxygen supplementation.^{1,10,12} Palliative therapy, such as diuretics in edematous patients, can help alleviate acute symptoms. Opioid drugs, with or without benzodiazepines, can control dyspnea until a definitive diagnosis is made, after which the underlying etiology becomes the focus of treatment.⁸ SVCS usually does not present as an immediately life-threatening condition; if appropriate, there is usually time for a tissue biopsy to be obtained in order to accurately diagnose the etiology.¹⁸ Steroids can be helpful in patients with SVCS due to lymphomas, but have no place in the treatment of small cell carcinoma of the lung.^{2,8}

Tomography of the mediastinum, venography, and placement of central venous catheters may actually worsen symptoms, because the increased venous pressure may lead to excessive bleeding. Similarly, intravenous administration of drugs should be avoided because of altered circulatory distribution and bleeding complications.^{1,18}

The mainstay of treatment has been radiotherapy or surgical resection (or both) of the compressing mass. Prospective, randomized studies show that neoadjuvant cisplatin-based chemotherapy with surgery prolongs the median and 5-year survival rates in patients with stage IIIA non-small cell carcinoma.⁷ However, 10-19% of patients have recurrent SVC obstruction after radiotherapy, and surgery is associated with high morbidity and mortality in most of these patients with advanced-stage cancer.⁵

In the past few years, it has become possible to stent the stenosed vena cava; Shah et al reported relief of SVC obstruction 24-48 hours after stenting in 7 of 10 patients; one of the remaining 3 patients had relief within 72 hours, but two failed because of extensive thrombotic occlusion of the SVC.⁵ Stenting has been particularly helpful in patients with SVCS caused by non-malignant fibrosing mediastinitis.³ Furthermore, transvenous cardiac pacemaker leads can cause thrombotic occlusion of the SVC and innominate veins. Ing et al have shown that pacing leads can be successfully run through stents placed in the SVC. This allows lead placement and simultaneously relieves SVC obstruction.⁶

Tanigawa et al compared stenting to conventional radiotherapy. They found that symptoms resolved in 78% of stented patients compared to 80% radiated patients. The mean survival was 145 days for the stented group, and 146 days for the radiotherapy group. There was no significant difference in the survival period between patients who received any prior radiotherapy and those who received stenting as primary treatment. They distinguished compression from intraluminal versus extrinsic tumors, because the latter had a better prognosis and longer survival.⁴ Presently, stenting is the treatment of choice for clinical symptoms that persist after conventional therapy.^{4,5}

As promising as stenting has been, it has some major drawbacks: in 10% of cases the stent is misplaced; in 10%, the stent occludes; in 5%, the stent migrates; and in 4%, chest pain is associated with stenting.⁵ Stents are thrombogenic, so anticoagulation should be used if the risk of thromboembolism outweighs the potential complications of bleeding. In the 10% of SVCS patients who have vena cava thrombosis, anticoagulation therapy might serve two purposes.²

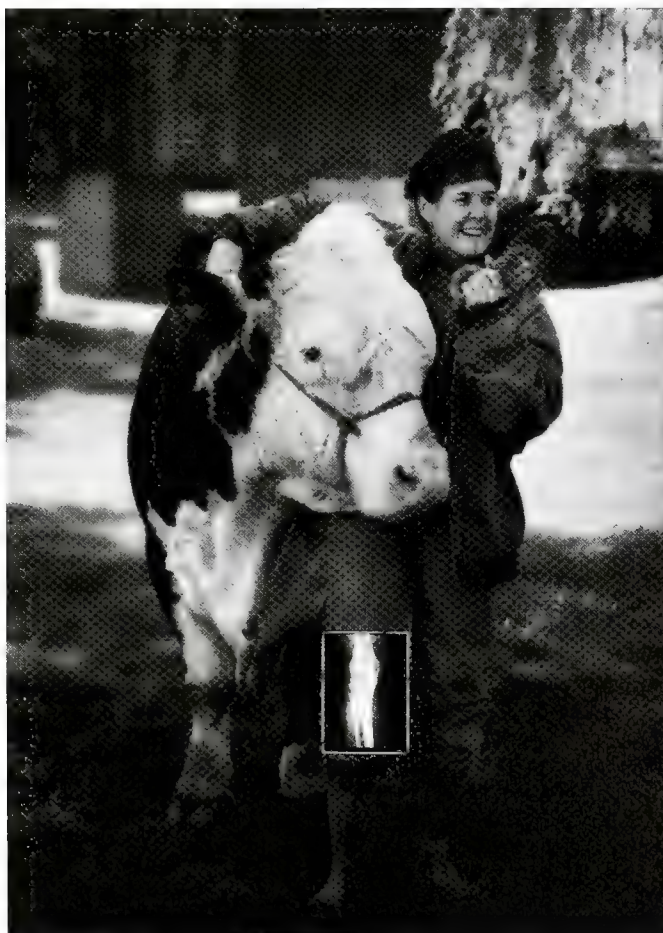
Conclusion

SVCS can present in dramatic or subtle fashion, depending upon the rate of venous occlusion, and the nature and location of the obstructing lesion. Our patient illustrates SVCS that had progressed subtly over six weeks. The diagnosis of metastatic cancer was made on a chest radiograph ordered to investigate coincident pulmonary findings. Radiotherapy and surgery have been the mainstays of treatment, but the advent of venous stenting has given us another therapeutic modality for use when conventional therapy fails.

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Some Reflections on the Origins of Biological Psychiatry

Guy K. Palmes, MD

The history of medicine is full of famous names. Some—Parkinson, Hodgkin, Wilson, Addison, Sydenham, Huntington, Alzheimer—are instantly recognized because their names are linked with common or important diseases; some—Wernicke, Meynert, Fallot, Nissl, Bell, Babinski—are remembered because their names are linked with human anatomy or pathophysiology. Sometimes, students and seasoned clinicians remember a disorder because of its eponym; at other times, they remember the name and forget the disorder; but rarely will they recall the features of a disease and forget the proper name associated with it. For whatever reason, doctors seem to be good at recalling the famous names of medicine, even if they're not familiar with the people behind the names.

As a Child and Adolescent Psychiatrist, I'm able to speak on the lives of Freud, Piaget, and Erickson, but I have known less about the background of other famous names in neurology and psychiatry. Recently, I decided to read about people like Meynert, Alzheimer,



Josef Babinski

From Haymaker, Webb. *The Founders of Neurology*, Second Edition, 1970. Courtesy of Charles C. Thomas, Publisher, Ltd., Springfield, Illinois.

Wernicke, Babinski, and Nissl. To my surprise, I not only learned something about their lives, I also learned that they had something in common with the clinicians I already knew—Freud, Erickson, and Piaget. I learned that Meynert, Alzheimer, Wernicke, Babinski, and Nissl had at one time or another called themselves psychiatrists or had worked in academic psychiatry clinics. I present here a very brief history of their lives and a short description of their contributions to medicine.

Josef Babinski (1857-1932) is best known for the toe reflex that bears his name. Specifically, Babinski's reflex refers to dorsiflexion of the great toe that follows stimulation of the sole of the foot. A positive Babinski reflex indicates a lesion of the pyramidal tract, except in infants where it can be normal up to the age 6 months.

During his day, Babinski was considered gifted both as a neurologist and as a psychiatrist, but not as an academician. He lived and practiced in France at a time when politics controlled academic appointments. From the 1820s through the 1870s, the government actually abolished the Paris School of Medicine, and only in 1877 did the government issue a decree introducing psychiatry clinics into the four

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French universities. During the 1890s, when Babinski was in practice, academic appointments were controlled by a single ministerial desk, and often appointments were based more on who you knew than on what you did. For political reasons, Babinski was denied the university post he desired, and, as with most French psychiatrists of the late 19th century, his station became the asylum. Ironic as it now seems, Babinski, whose name is known in every medical school, was prevented from practicing and teaching in a medical school.¹

Theodor Meynert (1833-1892) is best known for his contributions to histopathology (he refined tissue staining techniques) and for his discovery of neuroanatomical structures (the nucleus basalis of Meynert, also called the inferior olivary nucleus, and Meynert's commissure, a fibrous tract extending from the subthalamic body to the base of the 3rd ventricle). After graduating from the medical school in Vienna in 1861, Meynert embarked on a career in neuropathology at the asylum in Vienna and, in 1868, began lecturing on psychiatry. He was given an academic appointment by the Austrian government in 1870, but because of his interest in brain research, he came into continual conflict with more psychologically oriented asylum clinicians of the day. Eventually, he was mocked by some of his pupils, including Sigmund Freud, who complained that, although Meynert supervised a psychiatric clinic, he had no interest in working with the patients, most of whom he thought to be beyond help.¹ Some thought that his only tie to psychiatry was his interest in the history of delirium tremens.¹

Enduring the criticism, Meynert continued his search for anatomical bases of aberrant or atypical behavior. In a sense he was ahead of his time because he did not have the technological support needed to verify his theories. One of his proposals—that changes in blood circulation to the brain could lead to either excitement or depression—was labeled by critics as brain mythology.² Today, Meynert's ideas and his approach to research would be considered mainstream. It's a shame that the climate in which he practiced was so intolerant of his ideas, but his story both provides evidence of the progress of medicine through the years and demonstrates the continual swing of the pendulum between biological and therapy-based psychiatry.

Karl Wernicke (1848-1905) is best known for his work on aphasia. His name is associated with Wernicke's Aphasia, in which a lesion in the left posterior temporal lobe of the brain produces both receptive and expressive aphasia. As a result of this contribution, this area of the brain near the Sylvian fissure is known as Wernicke's area. Later in his career, Wernicke was recognized for his research on hemisphere dominance and for his description of Wernicke's encephalopathy, a thiamine deficiency that is associated with chronic alcoholism, gastric carcinoma, or hyperemesis gravidarum.

Wernicke was a student of Meynert's, and they worked



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together in Vienna after Wernicke graduated from medical school in 1870. Fame came early and quickly to Wernicke following his description, at age 24, of receptive/expressive aphasia. After making this important contribution, he relocated to Berlin where continued his research into mapping areas of the brain, and published a three-volume set on brain anatomy between 1881 and 1883.²

In 1885, Wernicke's interests turned to psychiatry. He began to search for a match between psychiatric symptoms and brain pathology. Over the next 20 years, he held a number of academic psychiatry appointments in Austria, and continued to formulate a vocabulary to support his hypotheses. Because some of his ideas were unpopular, he, like Meynert, was accused of fostering "brain mythology."² A physician to the end, Wernicke's last words were that he was "dying of autopsychic disorientation" after being struck by a truck while riding his bike. Alas, most of his vocabulary of psychopathology did not survive him.¹

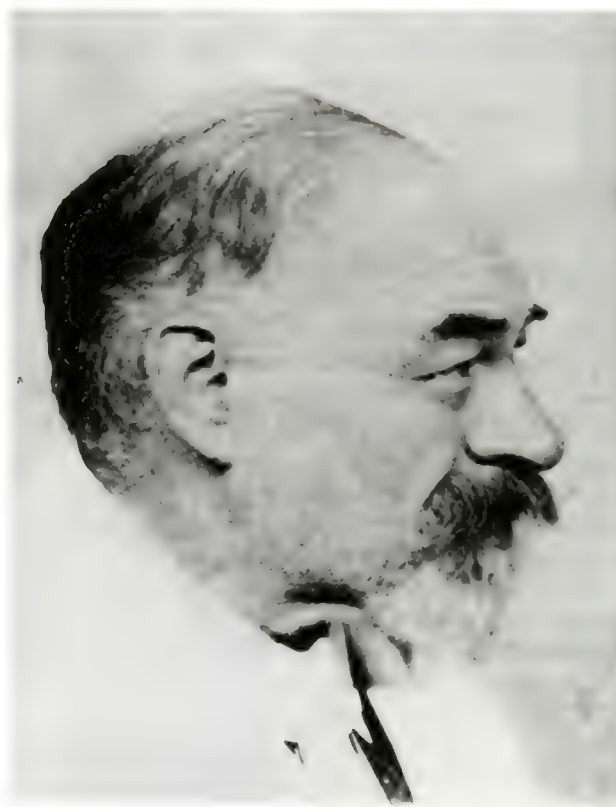


Franz Nissl

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Franz Nissl (1860–1919) is best known for his refinements of staining techniques in neurohistology, and for his discovery of Nissl bodies, the chromophil granules found in the cell bodies and dendrites of neurons. They are stained selectively by toluidine and other basic dyes, and are composed primarily of ribosomes. They are involved in protein synthesis and metabolism, but in certain disease states they disappear, a phenomenon known as chromatolysis.

Nissl completed his training in brain biology in Munich in the late 1870s, and spent much of the next 15 years hunched over a microscope. He became known in scientific circles not just for his research accomplishments (the advanced use of staining techniques, and his identification of various layers of the cortex), but also for his appearance and personality. Some described him as “curious with a blunt



Emil Kraepelin

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demeanor,”¹ but others said he was an obsessive-compulsive workaholic, who spent his nights in the lab and his days sleeping. He never married and never cared about his appearance or his selection of clothes. In 1895, Emil Kraepelin, a renowned psychiatrist, recruited Nissl from the Frankfurt city asylum to do brain research in the university psychiatric clinic in Heidelberg. There he worked alongside another famous neuroscientist, Alois Alzheimer.¹ For many years, Kraepelin studied the time course and symptoms of psychiatric conditions, while Alzheimer and Nissl continued their brain research. Kraepelin is now credited with characterizing manic-depressive illness and schizophrenia, which he termed *Dementia Praecox*, and for laying the groundwork for the development of the *Diagnostic and Statistical Manual of Mental Disorders* used today in psychiatry; Nissl and Alzheimer are known for their contributions to neurohistology. Their lab truly became a veritable *Who's Who* of turn-of-the-

century neuroscientists, and ushered in the field of neuropsychiatry.

Alois Alzheimer (1864-1915) is best known for the disease that bears his name. Alzheimer's disease, the most common form of dementia, is characterized by progressive degeneration of memory and mental function. Its histopathological hallmarks are senile plaques, neurofibrillary tangles, and neuronal loss in the basal forebrain, cerebral cortex and other areas.

Alzheimer began his research career alongside Nissl at the Frankfurt asylum. Over time, he and Nissl became great friends, possibly because both preferred to work at night and sleep during the day, but unlike Nissl, Alzheimer was a family man with an expansive personality. In 1903, he was recruited to the Heidelberg psychiatry clinic where he rejoined Nissl and worked very closely with Kraepelin for many years. It was in 1906 that he discovered the disease for which his name is still known.¹

Alzheimer, Nissl, Meynert, Wernicke, and Babinski had much in common. All lived and practiced in late-19th-century Europe, all left an indelible mark on medicine, and all worked in and around psychiatry. It is probably no coincidence that these men are not known for their contributions to psychiatry. Psychiatry in the late 19th century was very much a fledgling specialty, not held in very high esteem. Asylum clinicians dominated thinking, and Freud was just starting to formulate psychoanalysis. Neurology, on the other hand, was an accepted field—a field protective of its turf, as evidenced by the stories of Wernicke and Meynert. As is so often the case in science (think of Copernicus and Darwin), the early neurologists didn't look kindly on psychiatrists who borrowed their ideas. It may be that this competitive air helped foster the stigma surrounding psychiatry.

Today, for many reasons, psychiatry still struggles with stigmatization—from fellow doctors, managed care administrators, and the community as a whole. Fortunately, though, the stigma is less now than it was 100 years ago, because the medical community is starting to realize that psychiatry is not so different from other specialties. Research is showing that psychiatric conditions are treatable, that psychotropic medications are efficacious, and that therapy can be helpful.

Not long ago I had an interesting conversation with a third-year medical student in which we discussed the similarities, rather than differences, between psychiatry and neurology. We compared Alzheimer's disease to schizophrenia. Alzheimer's Disease is a degenerative disorder with a chronic and progressive course. Patients are severely disabled by the disorder in all realms of daily activities, and treatment is mostly palliative. Schizophrenia is a chronic disorder, which often shows a progressive course. It is extremely disabling and in many cases resistant to treatment. Both disorders are felt to be secondary to central nervous system



Alzheimer

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pathology, but the care of Alzheimer's patients often falls to the neurologists and the care of schizophrenics to psychiatrists.

We also compared bipolar disorder (manic-depression) to seizure disorders. Both are episodic and extremely disabling yet very responsive to treatment. In fact, the same medications (for example, Depakote) can be efficacious in both disorders. Yet again, most patients with seizures are treated by neurologists and those with bipolar disorder by psychiatrists.

The student asked, "What is the reason for the continued split between neurology and psychiatry?" One answer is historical. In 1906, when Alzheimer made his discovery,

medical technology was more primitive than it is today. Neurology assumed dominion over what Nissl and Alzheimer could find under their microscopes. What couldn't be found was called psychiatry, and it was given to Kraepelin and others to diagnose and treat. Only in the latter part of the 20th century, with advances in technology, have the similarities in brain function of the various disorders been recognized. Today, we have neuropsychiatrists and behavioral neurologists, and some conditions (for example, Tourette's Disorder) are treated by both psychiatrists and neurologists. The gulf between the fields has lessened, and I believe that continued research in genetics, brain chemistry, neurotransmitter and receptor biology, and neuroimaging will further

bridge the gap. I suspect that, as the gulf shrinks and psychiatry becomes a more universally accepted specialty, the stigma will disappear as well. I'm greatly encouraged by my conversation with the student. Let's hope this trend continues.

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Instructions for Authors

The *North Carolina Medical Journal* is a medium for communication with and by members of the medical community of this state. The *Journal* publishes six times a year: in January, March, May, July, September, and November.

The *Journal* will consider for publication articles relating to and illuminating medical science, practice, and history; editorials and opinion pieces; letters; personal accounts; poetry and whimsical musings; and photographs and drawings. Papers that relate to the present, past, or future practice of the health professions in North Carolina are especially pertinent, but manuscripts reflecting other perspectives or topics are welcomed. Prospective authors should feel free to discuss potential articles with the editors.

Manuscript Preparation

Prepare papers according to the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" (N Engl J Med 1991;324:424-8) with the following exceptions: 1) no abstract is needed; 2) no running title is needed; and 3) report measurements in metric units; use of the International System of Units (SI) is optional.

Submit a cover letter and a 3 1/2-inch computer disk that contains the text written in MS DOS- or Macintosh-compatible format. *Also enclose three hard copies of the text for review purposes.* Double space text with one-inch margins. *Please do not "format" the text* (e.g. no variations in type size, no bold face, no italics, no embedded endnotes).

Submit photographic illustrations, in duplicate, as high-quality color 35mm slides or 5-by-7 or 8-by-10-inch glossy prints, or as black-and-white glossy prints (5-by-7 or 8-by-10-inch). Label all illustrations with author's name, number them sequentially according to their position in the text, and indicate the orientation of the images, if necessary. *Do not write directly on the backs of prints.* This can damage them. If figures require printing in four-color process, we may ask the author to pay printing fees or a portion thereof.

Submit tables, charts, and graphs as hard copy *and* include copies on disk, in their original format *and translated as TIFF, PICT, or EPS documents.* Type all figure legends separately. Type and double-space all tables, one to a single sheet of paper. Tables must have titles and consecutive Arabic numbers.

Keep references to a minimum (preferably no more than

15), retaining those that document important points. The "Uniform Requirements" cited above contain reference format. We customarily list the first three authors for "et al"-type references. Authors are responsible for the accuracy and pertinence of all citations.

Avoid abbreviations entirely if possible; keep them to a minimum if not. When used, completely define abbreviations at the first point of usage in the text.

Manuscript Review and Editing

A medically qualified editor reads all manuscripts and, in most instances, sends them out for further review by one or more other members of the North Carolina Medical Society. *Authors' cover letters must include a line that states that their submitted manuscripts are not under consideration for publication elsewhere. It is not the Journal's policy to reprint previously published articles.* Decisions to publish or not are made by the editors, advised by the peer reviewers.

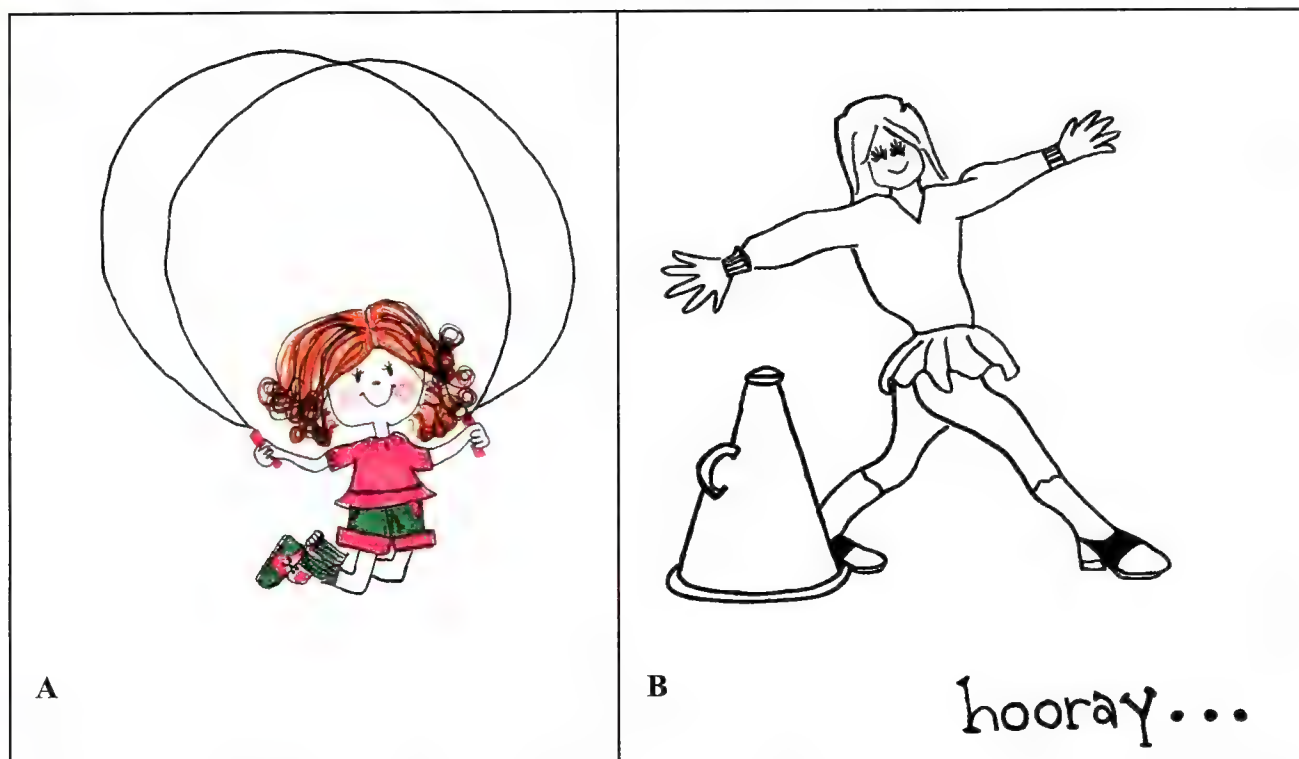
We encourage a relatively informal writing style since we believe this improves communication. Imagine yourself talking with your unseen audience—as long as this doesn't lead you to scientific or linguistic inaccuracy. Be brief, clear, simple, and precise.

We edit accepted manuscripts for clarity, style, and conciseness. Except for letters, authors receive a copy of the edited manuscript for their review and approval before publication. Manuscripts not accepted will not be returned.

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Submissions

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Self Perception in Anorexia Nervosa

Anorexia nervosa is a conundrum: People (usually young women) who appear entirely able to eat, do not and will not.^{1,2} The fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM IV) lists four criteria for diagnosis:

- ◆ Refusal to maintain body weight over a minimally normal weight for age and height.
- ◆ Intense fear of gaining weight or becoming fat, even though underweight.
- ◆ Undue influence of body weight or shape on self-evaluation, or denial of seriousness of the current low body weight.
- ◆ In women, absence of at least three consecutive menstrual cycles when otherwise expected to occur.

The etiology of anorexia remains completely obscure, and many of its known physiological and anatomical abnormalities have turned out to be the results rather than the cause of weight loss.¹ Over the years, several observers have commented on the fact that many sufferers have difficulties with sexuality, and the psychodynamically-minded amongst us have supposed that these patients want to avoid "growing up" into sexually developed adults.³ I had a remarkable example of this in the clinic.

Twenty-five years ago, I was asked to see a 21-year old college senior who had mild weight loss, amenorrhea, and a self-perceived inability to eat. She exercised a great deal. She had been given a diagnosis elsewhere of insensitivity to thyroid hormone, and treated briefly with thyroxine, which made matters worse. I diagnosed (mild) anorexia based on the criteria above, avoided hormonal therapy, arranged for psychiatric consultation, and followed her for a year.

In February, she sent a hand-drawn valentine (Figure A); in September, she wrote from graduate school in another state asking me to send medical records to her doctor there. She felt well. Enclosed was another unsolicited drawing (Figure B).

In my clinical notes, I recorded that she had done well in her school work and that she had made real progress in personal maturation. I believe the two drawings she sent me accurately, if unwittingly, reflect her growth toward a more adult self-image. It is not often that we get a chance to have Robert Burns turned on his head—to give to others the gift to see us as we see ourselves. I think she did this. I am grateful for the gift.

—Francis A. Neelon, MD

1. Walsh BT, Devlin MJ. Eating disorders: progress and problems. *Science*. 1998;280:1387-90

2. Garner David M. Pathogenesis of anorexia nervosa. *The Lancet*. 1993;341:1631-5.

3. Morgan JF, Lacey JH, Reid F. Anorexia nervosa: changes in sexuality during weight restoration. *Psychosom Med* 1999;61:541-5.

CME Calendar

July 9-13

30th Annual Emery C. Miller Medical Symposium

Place: Kingston Plantation, Myrtle Beach, SC
Credit: Up to 27.5 hours, Category 1, AMA, AAFP
Fee: \$575
Info: Wake Forest CME: 336/716-4450 or 800/277-7654.

July 14-18

Updates in Hematology-Oncology

Place: The Cloister, Sea Island, Georgia
Credit: 14.5 hours, Category 1, AMA
Fee: \$450
Info: Emory University CME, 1462 Clifton Rd. NE, Ste. 276, Atlanta, GA 30322. Tel: 888/727-5695.
Email: cme@emory.edu.

July 15-20

2001 Adult and Pediatric Allergy, Asthma, and Infectious Disease Update

Place: Bald Head Island Club, Bald Head Island, NC
Credit: Up to 29 hours, Category 1, AMA
Fees: \$450; before May 1: \$400
Info: About registration: Bob Iddings 336/832-8221; about content: Eric Kozlow, MD 336/373-0936
Online: www.gahec.org/cme

July 19-21

48th Annual Mountaintop Medical Assembly

Place: Waynesville Country Club, Waynesville, NC
Credit: Up to 13.25 hours, Category 1, AMA
Fees: \$300; \$250 2 days; \$200 1 day
Info: Registration: 828/452-8212; Hotel: 800/627-6250.

July 20-22

Heart Failure Management 2001: Established Therapy and New Frontiers

Place: Amelia Island Plantation, Amelia Island, FL
Credit: Up to 13 hours, Category 1, AMA
Fees: \$445 MDs; \$295 non-MDs; \$165 trainees
Info: UNC Chapel Hill CME, 244 Chase Hall, CB 7321, Chapel Hill, NC 27599-7321. Tel: 919/962-2118

September 24-25

Clinical Applications of Bone Densitometry (Minifellowship)

Place: Wake Forest University Baptist Medical Center
Department of Radiology
Credit: Up to 14.5 hours, Category 1, AMA
Fee: \$850
Info: Pat Rice, Dept. of Radiologic Sciences, WFU School of Medicine 336/716-2470 or 800/277-7654.

October 13-14

28th Postgraduate Course; The Alexander Spock Symposium

Place: Searle Center for CME, Duke University Medical Center, Durham, NC
Credit: 11 hours, Category 1 AMA
Fees: MDs: \$150 both days (\$100 Sat, \$50 Sun); others: \$90; trainees or emeritus: no charge
Info: Joseph Marc Majure, MD 919/684-2289

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Speaking of Medicine

TRUST

You should never trust experts. If you believe the doctors, nothing is wholesome; if you believe the theologians, nothing is innocent; if you believe the soldiers, nothing is safe. They all require to have their strong wine diluted by a very large admixture of insipid common sense.

—Robert Arthur Talbot Gascoyne-Cecil,
Marquess of Salisbury, 1877

We doctors have always been a simple, trusting folk! Did we not believe Galen implicitly for fifteen hundred years and Hippocrates for more than two thousand years?

—William Osler, 1909

It's a mighty conscientious doctor who will tell a rich man that his trouble is imaginary.

—Albert V. Harmon, 1911

Treat persons who profess to be able to cure disease as you treat fortune tellers.

—George Bernard Shaw, 1913

Make it compulsory for a doctor using a brass plate to have inscribed on it, in addition to the letters indicating his qualifications, the words "Remember that I too am mortal."

—George Bernard Shaw, 1913

Talk of your science! after all is said
There is nothing like a bare and shiny head;
Age lends the graces that are sure to please;
Folks want their doctors mouldy, like their cheese.

—Oliver Wendell Holmes, 1809-1894

Sick people, then, are people who are forced to trust.

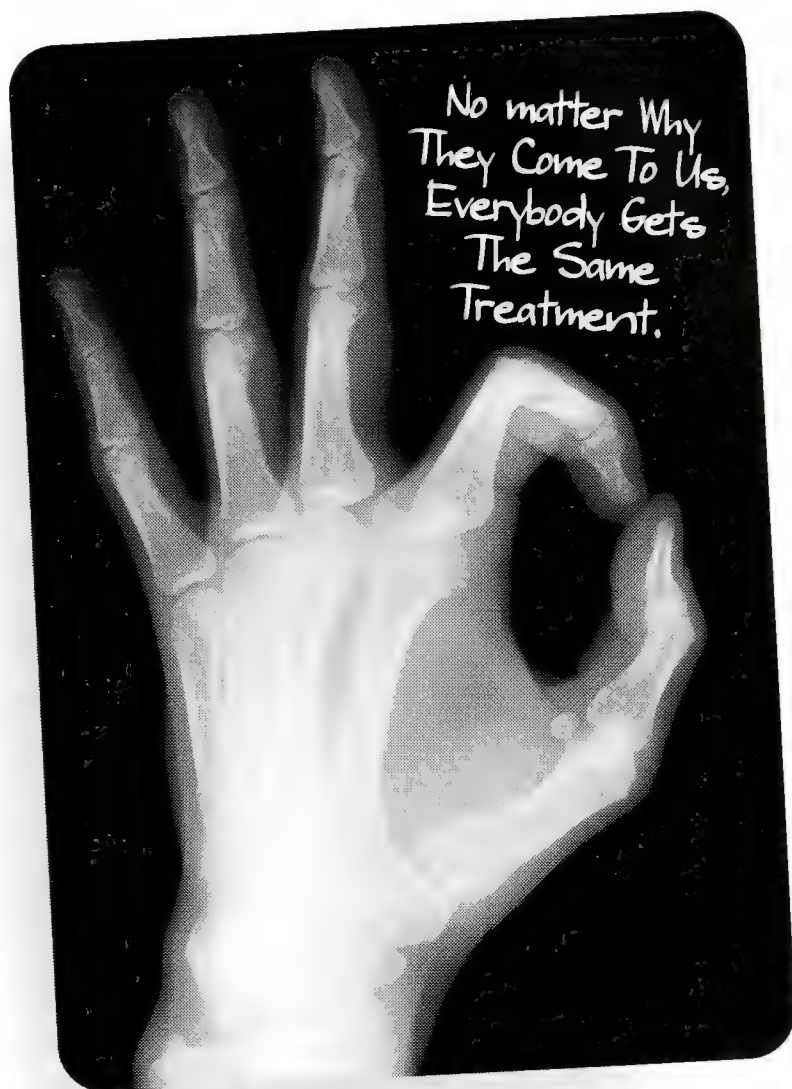
—Eric J. Cassell, 1986

Trust that man in nothing who has not a conscience in everything.

—Laurence Sterne, 1713-1768

Index to Advertisers

Amer. Acad. of Pharmaceutical Physicians	185
American Academy of Dermatology	203
Amer. Acad. of Orthopaedic Surgeons	223, 228
American Medical Writers Ass'n.	202
Clinic Pro	197
Compusystems	back cover
First Citizens Bank	inside front cover
Make-a-Wish Foundation	196
National Eye Institute	204
National Osteoporosis Foundation	219
.NCAPA	180-181
NCMS Endorsed Programs	231
Nextel	177
Physician Solutions	178
Ponce Moody	197
Sabre Capital	187
Sandhills Medical Associates	187
St. Paul Medical	187
Wake Radiology	inside back cover



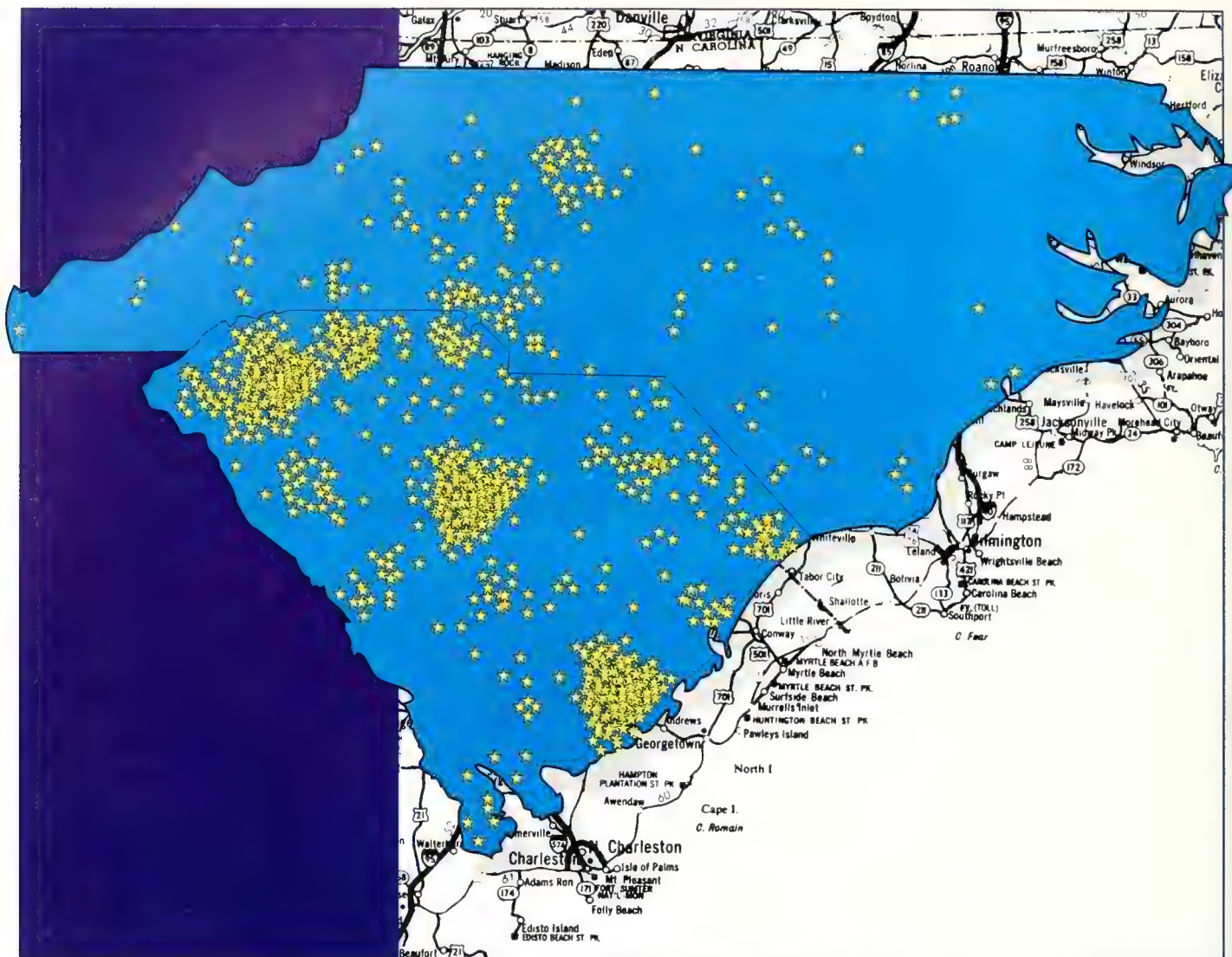
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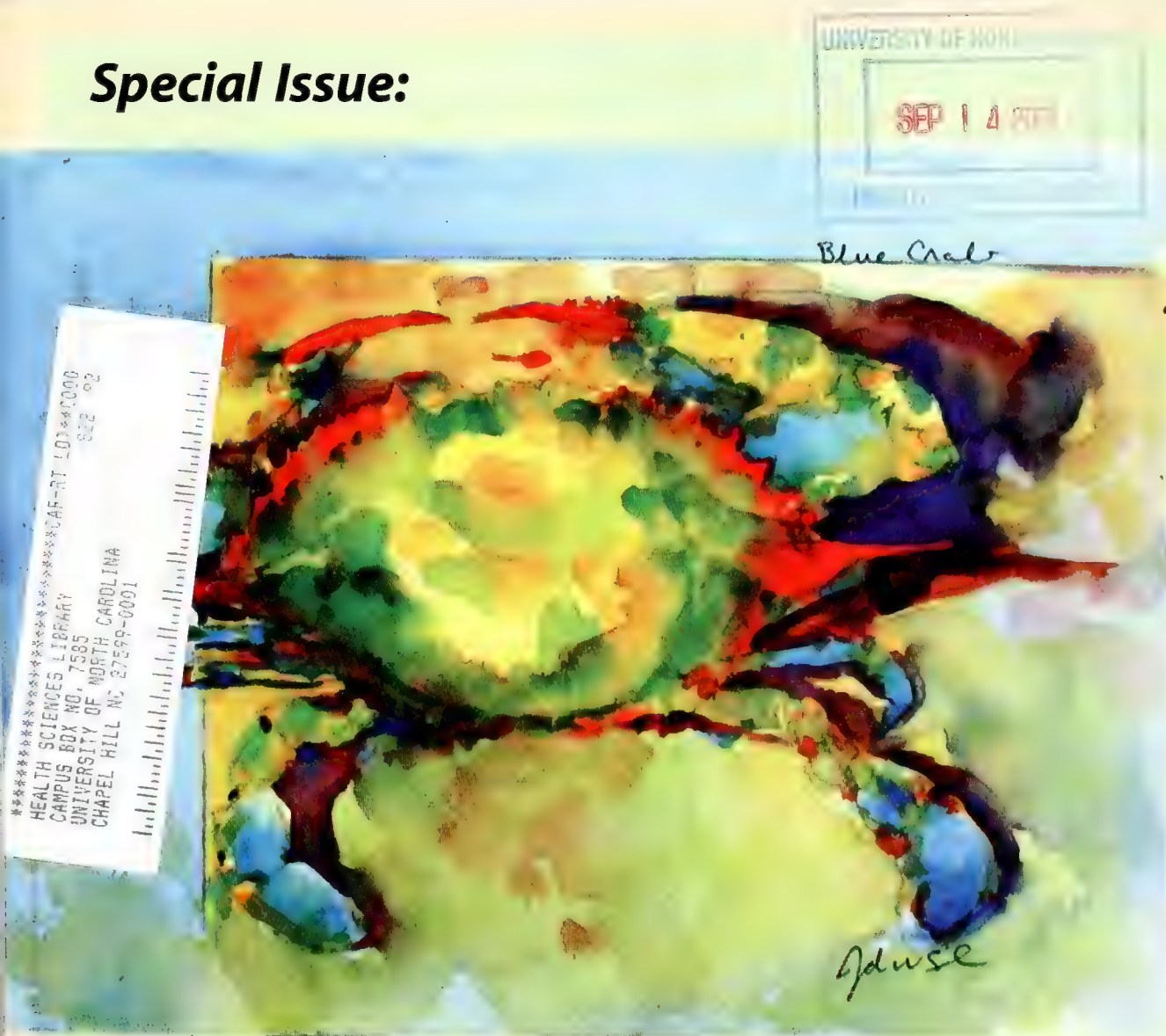
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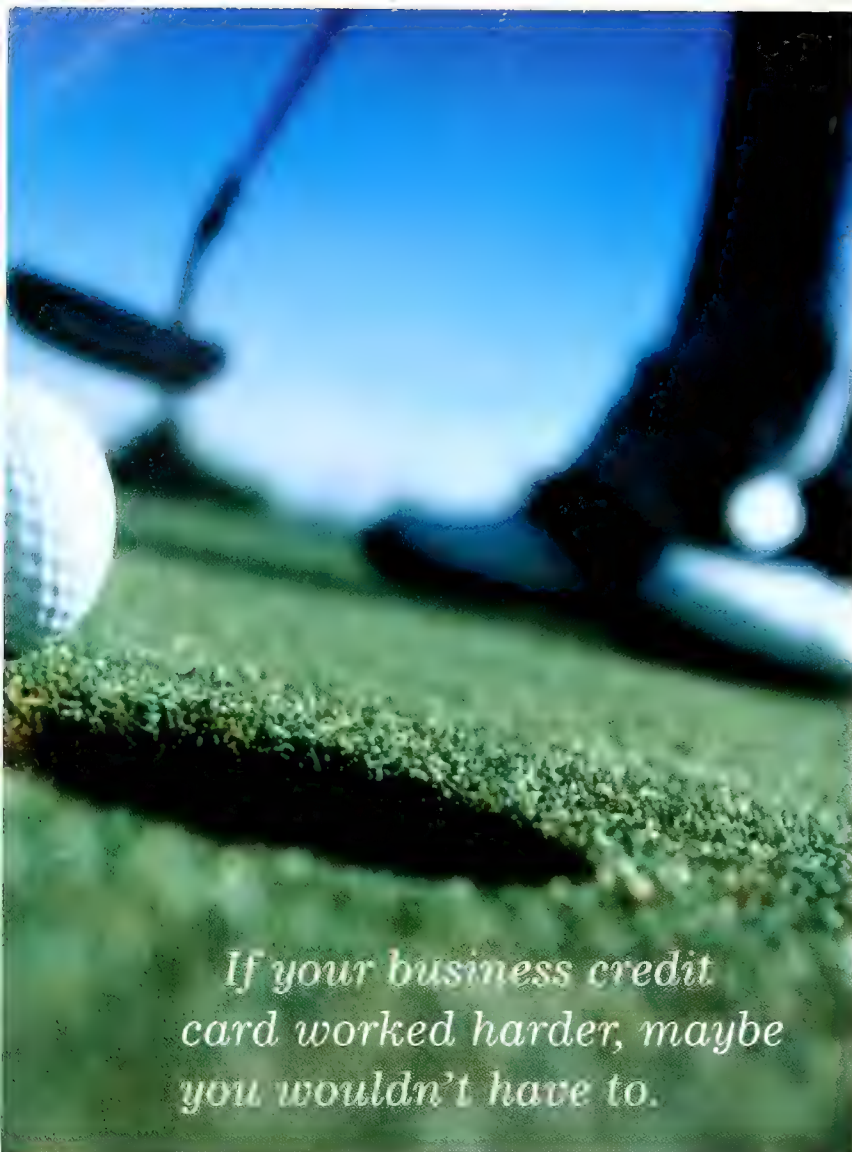
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For Doctors and Their Patients

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from the Editor, Editorial Board, and staff to those who have contributed to the *Journal* since our last acknowledgment. Your generosity and continuing faith in the value of this publication are what's keeping us afloat. We are deeply grateful—and we're still here! On the horizon, moreover, there's a distinct glimmer of hope...

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North Carolina Medical Journal

FOR DOCTORS AND THEIR PATIENTS

September/October 2001, Volume 62, Number 5

Cover: Cancer \ˈkan(t)-ser\ n [ME, fr. L (gen *Cancrī*), lit. crab; akin to Gk *karkinos* crab, cancer]. This watercolor of a North Carolina blue crab is by Outer Banks artist "Possum" Silver, owner of the John Silver Gallery in Manteo. It is reproduced by permission of the artist. Our thanks to him and the painting's owner, Martha M. Jenkins of Chapel Hill.

SPECIAL ISSUE: Cancer Control in North Carolina

- 246 We Want You to Know About Us! The North Carolina Cancer Control Plan 2001-2006
Joseph S. Pagano, MD
- 248 The North Carolina Cancer Control Program: Caring for Uninsured and Low-Income Patients with Cancer
Brenda Stone-Wiggins, MPH, Deborah Porterfield, MD, MPH
- 252 Cancer Control Legislation and Policy Milestones in North Carolina
Judith C. Wright, BSN, MPH, Lisa Poovey Greene, BS, and Tim E. Aldrich, PhD, MPH
- 256 Results from the North Carolina Youth Tobacco Survey: A Call to Action
Elizabeth Conlisk, PhD, Sally H. Malek, MPH
- 260 Teen Empowerment Movement to Prevent Tobacco Use by North Carolina's Youth
Jim D. Martin, MS, Kurt M. Ribisl, PhD, Delmonte Jefferson, Ann Houston, CH-ES
- 266 Labored Breathing: Policies to Eliminate Environmental Tobacco Smoke Exposure in North Carolina
Adam O. Goldstein, MD, Sally Herndon Malek, MPH, Anne Y. Butzen
- 281 'What Do They Know About It?' How the North Carolina Public Views Cancer Clinical Trials: Implications for Primary Care Doctors
Betsy Randall-David, RN, PhD, Nancy Stark, RN, PhD, Jennifer Gierisch, MPH, and Frank Torti, MD
- 286 Prostate Cancer as a Public Health Issue in North Carolina
Nancy Stark, RN, PhD, Electra Paskett, PhD, Wendy Demark-Wahnefried, PhD, Elena Carbone, DrPH, RD, and Paul Godley, MD
- 292 Colorectal Cancer Screening in North Carolina: Community Clinicians' Perspectives
Michael S. O'Malley, PhD, Nicholas J. Shaheen, MD, MPH, Melissa A. Crosby, MD, Sharon C. Murray, PhD, Jennifer S. Klenzak, MD, Joseph A. Galanko, PhD, Aneesh Singla, MD, David F. Ransohoff, MD, MPH, Robert S. Sandler, MD, MPH, James Gaither, MD, Electra D. Paskett, PhD
- 298 Colorectal Cancer in North Carolina: Risk Factors, Screening Behaviors, Incidence, Stage at Diagnosis, and Mortality
Elizabeth Conlisk, PhD
- 304 Better Pap Tests Using Liquid Based Technology
Nancy Gardner, MT (AASCP)
- 308 Cancer Control and the Central Cancer Registry of North Carolina
M. Robert Cooper, MD, Dale Herman, MSPH, and Tim E. Aldrich, PhD, MPH

BULLETIN BOARD

- | | |
|------------------------------|--------------------------|
| 243 Letters to the Editor | 311 CME Calendar |
| 272 Instructions for Authors | 312 Classified Ads |
| 285 Speaking of Medicine | 313 New Members |
| 291 Running the Numbers | 316 Index of Advertisers |

INFORMATION FOR PATIENTS

- | |
|---------------------|
| 273 Prostate Cancer |
| 275 Breast Cancer |
| 277 Cervical Cancer |
| 279 Clinical Trials |



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Letters to the Editor

Keeping It Interesting

To the Editor:

I very much enjoyed writing the article about the Siamese twins, "Why Did Eng Die?" [NC Med J 2001;62:66-8], and yet the thing I have enjoyed most is the response to it. Of all my publications, none has generated as many favorable responses as that one. These came from people who wrote notes, people who called on the telephone, and people who passed me in the hall, and told me how much they had enjoyed it.

The *North Carolina Medical Journal* continues to be a very important historical document for North Carolina and for medicine in particular. I only hope the leaders in our profession in North Carolina will see fit to continue the publication of this very important journal.

Eben Alexander, Jr., MD
Department of Neurosurgery
Wake Forest University Baptist Medical Center
Winston Salem, NC 27157-1029

Clarification of Terms

To the Editor:

Please educate me. I understand oral-oral transmission and fecal-oral transmission for H-pylori [Shah M, et al. *Helicobacter pylori*: a view from a primary care perspective, NC Med J 2001;62:198-202]. I do not understand gastro-oral!

John R. Dykers, Jr., MD
PO Box 565
Siler City, NC 27344

The Author Replies:

Gastro-oral transmission is similar to fecal-oral transmission but involves the gastric contents. Examples of such transmission would be (1) a nosocomial infection from uncleaned or improperly cleaned EGD scopes, or (2) vomitus getting into a water supply and then individuals drinking that water. Hope this clarifies the transmission types. Thanks.

MK Shah, MD
Massachusetts General Hospital
Boston, MA
mrugshah@hotmail.com

The Journal's a Page-Turner

To the Editor:

On the first of July, I finally got a quiet afternoon to curl up with the May/June *North Carolina Medical Journal*. I had flagged "Hearing the Story" by Mike McLeod [NC Med J 2001;62:119-21]. We've invited him to the Thursday Morning Intellectual Society, and I hope he'll come.

Then I got wowed by Bill Hensel's article on the education of an educator [pp. 122-3]; was greatly appreciative of Dr. Strawcutter's thoughts about therapeutic abortion [p. 124]. I was fortunate also to have time to read about estuary associated syndrome [pp. 126-32], and I'm trying to remember the name of the lady who originally investigated this and got so sick.

Then I got the wonderful treat of learning about vipomas and vasoactive intestinal polypeptide [pp. 134-9]. My sincere thanks to Charles Smith et al for relieving this chunk of my ignorance. Now I can't clean up this place; I have to save a space for this copy of the *Journal* until its treasures are better integrated into my synapses.

John R. Dykers, Jr., MD
PO Box 565
Siler City, NC 27344

From the Editor:

The name you're looking for is probably that of Joann Burkholder, PhD, Associate Professor of Aquatic Botany and Marine Sciences at North Carolina State University.

More on Spirituality in Medicine

To the Editor:

I really appreciated your "grain of salt" commentary on the article by Keung and McQuellon ["When Medical Meets Spiritual" NC Med J 2001;62:192-4]. In these days of evidence-based medicine, we ought not to be required to believe in the supernatural.

The doctor who is without a biopsychosocial model is like a stool with two legs. Even the surgeon whose patient will be temporarily unconscious must use psychosocial skills before and after surgery.

As a psychiatrist I must treat the patient as a person

whose joint participation in the treatment is essential. I have heard of self-styled Christian psychiatrists but do not place their competence above that of Muslim, Buddhist, or atheist psychiatrists.

No patient has ever asked me to pray for him. One, as soon as my office door was shut, closed his eyes and prayed out loud that I would be able to help him. I was—but no more or less than thousands of others who did not pray!

I believe that we medical professionals should interact with the very real personal problems of our patients and leave their spiritual concerns, if any, to spiritual professionals. Even so, as a professional who gets to know as much as possible about his patients, I can grade each person's religiosity on a scale of zero to extreme. Knowing their belief or lack of belief contributes to my understanding of the patient as a whole human being without my having to define "soul" or "spirituality."

John A. Ewing, MD
2311 Canterwood Drive
Wilmington, NC 28401

A Becoming Modesty

To the Editor:

I read with particular interest the article entitled "Two Neurosurgeons" in the July/August issue [NC Med J 2001;62:210-11]. I was fortunate to have been associated in practice with the author, Dr. William Sullivan, for some years. It was typically quite modest of him to recount others' accomplishments and not to state his own. He himself is a role model for all, both as an outstanding physician and as a skilled general surgeon.

Leopold M. Waldenberg, MD, FACS
PO Box 17200
Raleigh, NC 27619

It's Never Too Early to Start

To the Editor:

I am currently a premed student getting ready to apply to medical school. I was wondering if and how I could get a subscription to the North Carolina Medical Journal. And if that is possible, how much is it for a one-year subscription? Thank you for your time, and I look forward to hearing from you.

Timothy Corbett
2728 Meridian Drive, Apt. #2
Greenville, NC 27834

A Child's View of Caring for Epileptics

To the Editor:

Thanks for publishing my article, "Learning The Thunder," earlier this year [NC Med J 2001;62:43-4]. I've received many communications in response to this piece. Also, as a result of the article I've been invited to speak at the International Conference on Epilepsy Care later this month.

Blaine Paxton Hall, PA-C
Box 3014 DUMC
Durham, NC 27710

And One Who Appreciated It

To the Editor:

As we grow up, we all deal with problems with our families. These no doubt mold our lives. My heart goes out to Blaine Hall after reading his article in the *North Carolina Medical Journal* [see above. Ed.] I think he has an important message for his colleagues in medicine: to have just a little more empathy for the patients they see. I think if persons who take care of patients with epilepsy would listen to him, they would gain a great deal more insight into the needs of their patients.

My thanks to the author for that article. I know the Lord loves him.

J. Baldwin Smith, MD, ACP, ABSM
Summit Epilepsy Center
Winston-Salem, NC 27103

We encourage and welcome letters from our readers. Type and double-space all text, keeping length to under 500 words. Longer letters may be considered for publication as commentaries. We reserve the right to edit and abridge all copy. Send by mail: North Carolina Medical Journal, Box 3910, DUMC, Durham, NC 27710; by fax: 919/286-9219; or by email: nash0004@mc.duke.edu.

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We Want You to Know About Us!

The North Carolina Cancer Control Plan 2001-2006

Joseph S. Pagano, MD

Chair, NC Advisory Committee on Cancer Coordination and Control

Lineberger Professor of Cancer Research and Director Emeritus

UNC Lineberger Cancer Center

All doctors and everyone else working to prevent and detect cancer, and treat patients living with cancer, have an ally in the North Carolina Advisory Committee on Cancer Coordination and Control (NCACCCC). We are working with you—sometimes silently, but increasingly, we hope, audibly and visibly. We want you to know about us!

John Kernodle, MD, the force behind the formation of this state-wide advisory committee, began our work in 1991. By 1993, the Advisory Committee had been established and funded by the North Carolina Legislature; since that time it has functioned as North Carolina's cancer council and coordinating body. It has as members representatives of the NC Medical Society; the Old North State Medical Society; the four University Cancer Centers; the NC Departments of Health and Human Services, Environment and Natural Resources, Public Instruction and Community Colleges; the NC Hospital Association; the NC Nurses Association; the American Cancer Society; the NC Oncology Society; NC Licensed Primary Care Physicians; the American College of Surgeons; the NC Association of Health Plans; the Association of NC Cancer Registrars; cancer survivors; and six members of the NC Legislature. The Advisory Committee works closely with and—through special appropriations—is staffed by the NC Division of Public Health.

Dr. Kernodle understood the need to coordinate the state's many cancer-related activities to give them a greater

collective impact, so that North Carolina would have cancer policies that hit the mark as effective, accepted, and supported by all. In particular, the Advisory Committee, by capturing the attention of the Legislature, has been able to

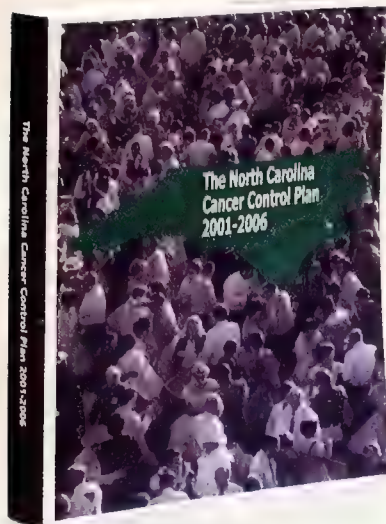
serve as a guiding force behind the NC Central Cancer Registry. The work of the Registry is vital to understanding the dimensions of the cancer problem in North Carolina, and how we lead—or lag—compared to the rest of the country (see the article by Cooper et al on page 246). The Committee promotes cancer research and helps attract grants to North Carolina from private and federal sources.

Our mission is to reduce cancer incidence and mortality in North Carolina and to enhance access to quality treatment and support services. We do this through the work of five subcommittees (Prevention, Early Detection, Care, Legislation and Education, and Evaluation) that educate and advise government of-

ficials, public and private organizations, and the public.

These subcommittees, and their task forces and workgroups, are made up of cancer experts, citizens, and legislators from all over North Carolina. The parent committee meets quarterly. Its meetings and those of the subcommittees and workgroups are informed, purposeful, and often intense, because in the field of cancer goals, means, and recommendations are complex and sometimes controversial.

The first achievement of the Advisory Committee was to develop, publish, and present to the NC General Assem-





The new North Carolina Cancer Control Plan 2001-2006 was presented to the General Assembly on June 19, 2001, by Dr. Joseph S. Pagano and Senator Fountain Odom, Chair of the Legislative/Education Subcommittee of the Advisory Committee. Left: Senator Odom welcoming all to the ceremony introducing the new plan. Right: Dr. Pagano, Lt. Governor Beverly Perdue, and Senator Odom enjoy their part in the ribbon-cutting. Photos courtesy of the NC DHHS Office of Communications.

bly *The North Carolina Cancer Control Plan 1996-2001*. This plan, remarkable for its breadth and the consensus reached by the many constituents interested in cancer in North Carolina, became one of the best comprehensive cancer plans in the United States. The CDC (US Centers for Disease Control and Prevention) recognized its excellence and distributed it to other states as a model for state-level comprehensive cancer control plans. We continue to receive requests for it from other states. The Plan is distinguished not only by its comprehensive goals, but by its realistic commitment to achieving milestones. By the end of its fourth year, 76% of the strategies listed in the Plan had been implemented. The flavor of some of our activities is reflected in this special issue of the Journal.

Our second five-year plan, *The North Carolina Cancer Control Plan 2001-2006*, was completed in May 2001, and presented to the NC General Assembly on June 19. We will join forces with over 80 statewide partners to implement the 309 strategies in the new Plan. We aim to be an ever more effective force for preventing cancer in North Carolina, particularly smoking-related cancers in young people and women. We strongly support those who want to quit smoking and those who want to reduce environmental tobacco smoke (see the articles by Conlisk and Malek on page 256, Martin et al on page 260, and Goldstein on page 266).

North Carolina still has a long way to go in the detection of breast and cervical cancer, especially among underprivileged persons. The growing Hispanic population will make it necessary to revisit North Carolina's existing programs for these cancers. One step in improving the early detection of cervical cancer was the Advisory Committee's support of the

ThinPrep method of Pap smear testing by the NC State Laboratory (see article by Gardner on page 304). This method increases the accuracy of testing and reduces the need for follow-up tests. This is of particular importance for patients of lower socioeconomic status who may have difficulty returning for repeat testing because of problems with transportation, work arrangements, etc.

Colon cancer is another current emphasis (see the articles by Conlisk on page 298 and O'Malley on page 292). Although we do have a long way to go, we have just received a major endorsement of our goals: the NC Legislature in 2001 passed legislation mandating insurance coverage for colorectal cancer screening consistent with guidelines of the American Cancer Society.

PSA testing for detection of prostate cancer remains a vexatious issue, to which we have brought energy but no more clarity than exists elsewhere (see the article by Stark et al on page 286). We have vigorously addressed (but not solved) issues of pain control in cancer, disparities in access to care, and standards of diagnosis and treatment for patients with cancer (see articles by Randall-David and Stark on page 281, Wright et al on page 252, and Porterfield and Stone-Wiggins on page 248). We have championed and gained legislative backing for the importance of clinical trials of new therapeutic agents in a time of increasing abundance and innovation.

Our hope is ultimately to affect how all doctors in North Carolina think about cancer, and how they advise patients; we want to alert all persons at risk about how to protect themselves from the maladies of cancer.

We want you to join us in this great effort.



The North Carolina Cancer Control Program

Caring for Uninsured and Low-Income Patients with Cancer

Brenda Stone-Wiggins, MPH, Deborah Porterfield, MD, MPH

"You have cancer." Last year, nearly 36,000 North Carolinians heard their doctors say these life-changing words, and began the process of evaluating their treatment options.¹ North Carolina, which has three National Cancer Institute-designated comprehensive cancer centers, 10 Community Clinical Oncology Program (CCOP) sites and 27 American College of Surgeons (ACOS)-approved cancer programs, is highly regarded for its state-of-the-art cancer treatment. But despite the apparent abundance of availability, some North Carolinians, especially those with no insurance or a third party payor, find that access to the most effective therapies is limited by their inability to pay for care.

The Unknown Burden of Uninsured Persons with Cancer

Other than simple estimates of the number of affected persons, we know almost nothing about the burden of cancer among uninsured persons in North Carolina or the nation. The Institute of Medicine estimates that 7% of US cancer patients have no insurance;² data from the NC Central Cancer Registry suggest the percentage in North Carolina is 3.4% (NC State Center for Health Statistics, unpublished data). Since cancer affects predominantly older persons, who are likely to have Medicare, the proportion of uninsured cancer patients is less than that for the general population. Nevertheless, there are still 86,000 persons in the US with a cancer diagnosis and no health insurance.²

Lack of insurance is associated with worse cancer outcomes. Several studies have reported that, even after adjust-

ment for other sociodemographic variables, patients without insurance are diagnosed at later stages and have higher mortality.^{3,4,5} Lack of insurance may increase cancer mortality in several ways. A number of national surveys, such as the Behavioral Risk Factor and Surveillance Survey, note that uninsured persons are less likely to be screened for cancer.^{6,7} Quality of care often suffers when patients lack insurance. High out-of-pocket costs may inhibit patients' ability to return for follow-up of abnormal results, or to comply with treatment recommendations. An awareness of costs also may affect doctors' recommendations in staging or therapy. Finally, lack of insurance is more prevalent in lower-income and minority populations, who may have transportation, literacy, and language/cultural barriers to quality care.

The Cancer Control Program

North Carolina has been at the forefront in addressing the cancer-related needs of its indigent residents. In 1945, under the Cancer Control Act (General Statutes 130A-205), and at the urging of the Women's Field Army (now the American Cancer Society) and the North Carolina Medical Society, the NC General Assembly established a Cancer Control Program (CCP). The statute included a provision that the Cancer Committee of the North Carolina Medical Society serve as an advisory council to the Department of Health and Human Services. The legislative purpose was "to establish and administer a program for the prevention and detection of cancer and for the care and treatment of persons with cancer." This was the first such program in the nation. The Program

The authors are both in the Division of Public Health, North Carolina Department of Health and Human Services, where Ms. Stone-Wiggins is Manager of the Cancer Control Program. Address correspondence to Ms. Stone-Wiggins at Cancer Control Program, 1915 Mail Center, Raleigh, NC 27699-1915. Phone: 919/715-3148; fax: 919/715-3133.

was initially funded by a grant from the American Cancer Society, but in 1947 the legislature took over funding. The amount budgeted has gradually increased over the years from an initial appropriation of \$36,700 to \$3,934,972 for fiscal year 2001.

For 56 years, the Cancer Control Program, administered through the Department of Health and Human Services' Division of Public Health, has served indigent cancer patients by covering medical care for eligible individuals who need inpatient or outpatient diagnostic and treatment services. The Program uses several mechanisms to further its goal of improving cancer detection and treatment: direct payments to doctors and hospitals through the Purchase of Medical Care Services (POMCS); contracts with outpatient cancer centers; and cancer prevention and screening programs through local health departments.

Direct payments to doctors and hospitals through POMCS account for 64% of the Program's funds. In FY 2000, 460 fee-for-service providers delivered CCP-sponsored diagnostic services to 1,507 North Carolina residents at an average cost of \$573; 93% of recipients were female; 34% were minority; and 73% had no third party coverage. In that same year, 299 providers delivered CCP-sponsored treatment services to 549 North Carolina residents; 88% were female; 42% were aged 21-34; 34% were minority; and 66% had some type of third party coverage.

The average cost of Program-sponsored treatment was \$2,063/patient. The breakdown by cancer diagnosis was as follows: 19% breast, 59% cervical (including pre-cancerous conditions), 3% colon, 1% lung, 2% prostate, 2% skin, and 14% other. It is important to note that the Program succeeds in serving primarily those with little or no resources for diagnostic and treatment services. To be eligible for the Program, recipients must have gross incomes at or below 115% of the poverty level (that is, at or below \$19,608 for a family of 4). In actuality, more than half of those served during FY 2000 had incomes that were less than 85% of the federal poverty level.

The Program covers up to eight days of diagnostic services and 30 days for treatment services per state fiscal year. Two follow-up visits can be included in those limits. Providers are encouraged to schedule several services on a single day to ensure maximum benefit for their patients. Requests for inpatient diagnostic services are approved only if justified by medical necessity. The Program generally covers both hospital and professional services. Reimbursement is set at the NC Medicaid rate (except for hospital inpatient care, which is paid at 80% of their cost rate). Beginning in fiscal year 2000, the Program limits each claim payment to 1% or less

of the annual POMCS fee-for-service providers' budget (approximately \$25,000 for FY 2001).

Palliative care, drugs for use outside the treatment facility, and reimbursement for travel are not covered. Reconstructive surgery may be covered, but only when the Cancer Control Program paid for a treatment related to the same diagnosis. Meals and overnight stays can be covered only in conjunction with treatment services covered by the Program, and only if the treatment facility is over 50 miles from the patient's home.

Eligibility and Enrollment of Patients

To qualify for diagnostic and treatment services through the Cancer Control Program, patients must satisfy the following requirements:

- ◆ **Residency.** Patients must live in North Carolina and intend to make North Carolina their permanent home, or qualify as migrant farmworkers or dependents of one. Illegal aliens must have applied through Immigration and Naturalization Service for resident alien status and document intent to be permanent residents of the state. Foreigners with temporary visas are not considered permanent residents.

- ◆ **Financial.** The income scale, which is updated each July 1, is based on 115% of the federal poverty level. The Program calculates eligibility using the patient's or family's gross income from the 12-month period prior to the requested date of service or the application date, whichever is earlier. Medical expenses cannot be deducted from gross income. Once patients are approved, there

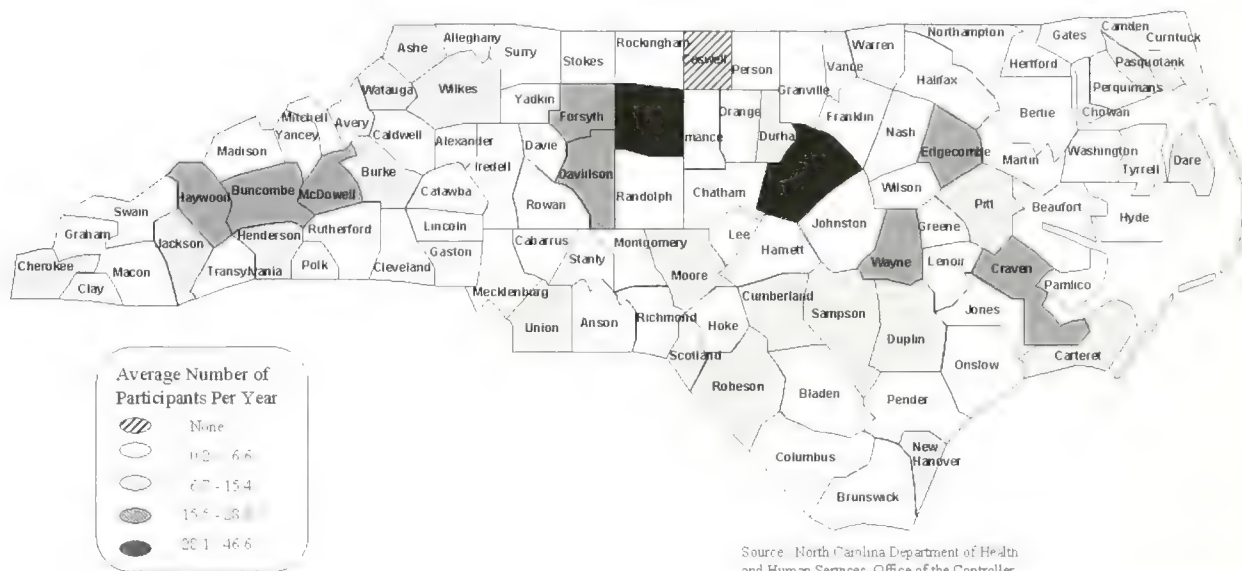
is a 12-month period during which providers must initiate authorization requests for necessary diagnostic and treatment services.

- ◆ **Medical.** The patient must have a condition that strongly suggests cancer and requires confirmation of the preliminary diagnosis, or the patient must have a known cancer and a $\geq 25\%$ chance of surviving for five years (based on the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) data, which are available online at http://seer.cancer.gov/Publications/CSR_1973_1997/).

Over the past two decades, the Program has instituted several policy changes affecting eligibility and benefit. In FY 92, medical eligibility was limited to the current 25% chance of five-year survival. In FY 95, the number of diagnostic and treatment service days was expanded from 2 to 8, and from 8 to 30, respectively. The financial criterion (percentage of federal poverty level) has varied over time, from 100% (net

"High out-of-pocket costs may inhibit patients' ability to return for follow-up of abnormal results, or to comply with treatment recommendations. An awareness of costs also may affect doctors' recommendations in staging or therapy."

1996 - 2000 North Carolina Cancer Control Program Average Annual Number of Participants Served, Treatment Services



income) to 200% (gross income). The latter limit only pertained for the period of July 1995 through March 1997.

A major concern is that the current financial eligibility requirement (gross income $\leq 15\%$ of the federal poverty level), instituted in response to the FY 97 budget shortfall, too severely limits access for many cancer patients, particularly the working poor without insurance coverage. Essentially, they "fell through the cracks." With the shift from net to gross income, a minimum-wage earner cannot qualify. The present financial eligibility requirement, which considers gross income during the twelve months prior to the treatment request or application, and which does not allow deductions, essentially excludes previously working patients who had no insurance or lost it when they could not work during their treatment. For some, not qualifying for the CCP may mean delaying or forgoing treatment services.

Providers have up to one year from the date of service to submit to the Program an application for coverage. Usually the provider works with the local health department, hospital social worker or financial counselor to complete the required two-part application (financial eligibility form and service authorization request). Efforts are under way to have the forms and Program information available on the North Carolina Advisory Committee on Cancer Coordination and Control website (www.nccancer.org).

Cancer Prevention and Early Detection

For more than 50 years, the Cancer Control Program has supported education and services related to the prevention and early detection of cancer. Breast and cervical cancers have been a focus for the Program, which since 1994 has funded breast cancer and cervical dysplasia clinics by contracting with outpatient cancer centers. For several years, the Program has supported a statewide public awareness campaign about the risk of skin cancer from ultraviolet radiation exposure, as well as skin cancer prevention and screening programs at local health departments.

Evaluation and Future Directions

Even though many patients are already being helped, the Cancer Control Program is currently comparing utilization data with information from the NC Central Cancer Registry to seek means to increase its reach and effectiveness. Specifically, the program seeks to answer the following questions:

- ◆ How many patients are eligible for the CCP each year, and how many are enrolled?
- ◆ Are patients with specific cancer types enrolled more frequently than others?

- ◆ Are there any racial, ethnic, or geographic disparities in who is enrolled in the CCP?
- ◆ What types of cancer patients are using the authorized service day limit?
- ◆ What are the current coverage gaps due to policy changes by other parties who provide indigent cancer care?

The Program expects its evaluation to be completed in December 2001. Preliminary results suggest that the Program enrolls between one-half to three-quarters of eligible patients. Uninsured breast and cervical cancer patients are more likely to be enrolled than prostate or lung cancer patients. Nearly one half of the patients enrolled for treatment are patients with pre-cancerous conditions of the cervix. The racial and ethnic distribution of CCP patients is similar to the overall population distribution of the state, suggesting that minorities are under-represented in the CCP. Marked geographical disparities in enrollment, visible in the Figure, may reflect the distribution of uninsured patients as well as variations in referral patterns due to lack of awareness by providers.

The results of our evaluation will allow us to plan and design outreach interventions, as well as to formulate policy and regulatory changes for better fulfillment of the Program's mission. To successfully achieve its mission of insuring access

to quality cancer care for indigent North Carolinians, it is important that the Program's policies respond to changes in cancer treatment standards as well as health care funding policies.

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Cancer Control Legislation and Policy Milestones in North Carolina

Judith C. Wright, BSN, MPH, Lisa Poovey Greene, BS, and Tim E. Aldrich, PhD, MPH

Cancer, the nation's second leading cause of death, is consistently ranked as one of the leading US public health problems. Development of cancer control policies on a national level began with President's Nixon's declaration of the national "War on Cancer" in 1971. As a result of that initiative, the National Cancer Institute (NCI) was asked to escalate cancer control efforts and to implement a process of distributing comprehensive cancer research centers nationwide. Duke University was among the first 12 NCI-designated comprehensive cancer center sites. Two decades later, in the early 1990s, the Centers for Disease Control and Prevention (CDC) received substantial appropriations to enhance breast and cervical cancer screening, and to establish a National Program of Cancer Registries.¹ At the time these national programs were starting up, the CDC began coordinating the establishment of cancer control programs in every state.

In 1995, North Carolina was in the second year of implementing its cancer control coalition, but cancer control efforts in many states were limited to "capacity building." Because a few states' funds were building "comprehensive" cancer control programs, the CDC developed a handbook, the *Blue-Print for Comprehensive Cancer Control*, to guide the organizing of state-based comprehensive cancer control programs.² Salient elements of these programs included (1) the presence of a statewide coalition for cancer control, and (2) the implementation of a statewide cancer control plan. This article represents our recollections of the events leading up to the passage of the pivotal legislation and some of the earlier activities related to the adoption of the first statewide cancer control plan in 1996. We present these observations on the

occasion of the adoption and implementation of the second North Carolina Cancer Control Plan.

Background

In 1933, the North Carolina Medical Society formed its Committee on Cancer. Later, in the early years after War World II, the American College of Surgeons began to promote the formation of cancer registries.³ During the post-war years, over 30 states passed legislation establishing central cancer registries and, in many, state-based programs for cancer control. North Carolina was one of those states. In 1945, the General Assembly passed legislation (GS 130A; see Table) providing for cancer registration by the State Health Department and creating within the agency a program to "reduce the impact" of cancer on citizens. This legislation more or less languished for 40 years; funds were scanty and little was done; there were few active periods of cancer control policy development, except as related to breast and cervical cancer screening and the appropriation of funds to pay for indigent cancer care.

Cervical cancer screening brought two prominent forces onto the cancer control scene in NC: Dr. John Kernodle and the volunteers of the American Cancer Society, including Dr. Charles Spurr. Dr. Kernodle, a prominent gynecologist from Burlington, had been trained by Dr. George Papanicolaou in the use of cervical cancer screening with the then innovative technique of exfoliate cytology (reading the microscopic appearance of cells 'shed' normally by the body). Dr. Kernodle brought the technique to North Carolina and, in concert with the American Cancer Society, lobbied to make this inexpensive screening procedure available to all women in the state. It should be noted that in the 1950s cervical cancer was the leading cause of cancer death among women, particularly economically disadvantaged women.

The Pap test brought a breakthrough in early detection, but it led to a new dilemma: how to find treatment for the poor women now diagnosed with cervical cancer. Hence the

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Table. Cancer control-related legislative actions in North Carolina

Cancer-related legislation before 1990

GS 130A-205	Established Cancer Control Program and administrative rules
GS 130A-206	Financial aid for cancer diagnosis and treatment
GS 130A-207	Designated cancer clinics
GS 130A-208	Established Central Cancer Registry; mandated reporting all new cases

Cancer-related legislation from 1993-4

GS 58-50-155	Established standard and basic health-care plan coverage
GS 58-50-156	Coverage for prescribed drugs for cancer treatment
GS 58-51-57	Coverage for mammography and Pap smear screening
GS 58-51-58	Coverage for prostate specific antigen screening
GS 130A-33.50-51	Established Advisory Committee for Cancer Coordination and Control

Cancer-related legislation submitted in 1995-96

S335	Appropriated funds for Central Cancer Registry
H218	Directed DEHNR use of appropriated funds (NCACCCC)
H439/S432	State employee health plan coverage of cancer screening

Cancer-related legislation submitted in 1997-98

H62/H318/S255	Appropriated funds for Cancer Control Program
S1282	Added members to ACCCC
H813/S714	Coverage for reconstructive surgery
S1215	Funds for [cervical] cancer screening
H815/S701	Donations from taxes for breast cancer research

Cancer-related legislation submitted in 1999-2000

S998	Changed membership terms for ACCCC
S273	Authorized charges for state-collected cancer reporting
S274	Appropriated funds for cancer control programs
S781	Insurance coverage for clinical trials

Cancer-related legislation submitted in 2001

S72/H1312	Funds for pediatric cancer programs
S132	Insurance coverage for [colorectal] cancer screening
H566/S537	State matching funds for receipt of federal Medicaid breast and cervical cancer treatment coverage

initiative led by Dr. Kernodle of Duke University Medical Center and Dr. Spurr of Bowman-Gray Medical School. With legislative appropriations from the NC General Assembly, a series of eight cancer clinics were established at regionally distributed hospitals. These clinics provided care for indigent cancer patients.

Over the years, the state health department's cervical cancer screening and cancer care for the indigent programs have waxed and waned, but they have always remained functional to some degree. The extensive cytology program at the State Laboratory is an outgrowth of the efforts led by Dr. Kernodle and his colleagues to provide reading of the Pap smears produced at the county health departments. Training programs for laboratory technicians are another 'spin-off' of these efforts.

Dr. Spurr championed another cause pertinent to cancer control. The treatment of cancer patients was evolving rapidly in the 1960s and 70s. The emergence of chemotherapy and recognition of the importance of scientific clinical trials of treatment regimens underscored the need for high quality data collection on cancer patients, and for information on the outcomes of cancer care—activities associated with cancer registries. In the 1970s, the staff of the NC Cancer Control program (the group that dispenses the funds that provide care for indigent patients and for the operation of cancer clinics) began promoting cancer registries in funded hospitals. At the same time, surgeons were getting similar recommendations from the American College of Surgeons.

In 1975, a National Tumor Registrars Association was founded, and one year later, a North Carolina chapter was established under the leadership of Ms. Luna Woods of Duke University. Over the next decade, as the state's large hospital cancer databases were being developed, support grew for pooling the data in a central cancer registry.³ In 1986, Dr. Spurr, the NC Medical Society, and the American Cancer Society had made it a priority to have the legislature underwrite a North Carolina Central Cancer Registry. In 1988, state appropriations were received and the current Central Cancer Registry [CCR] was begun⁴ (see the article by Cooper et al on page 308).

The Advisory Committee for Cancer Control and Coordination

As data came in to the CCR, a variety of high-risk patterns became apparent. Among the more distressing findings were age and race disparities in cervical cancer incidence and mortality. In 1991, Dr. Kernodle led a coalition of the American Cancer Society, NC Equity, and several women's organizations to push legislative funding of a statewide task force to evaluate cervical cancer control within the state. That statewide coalition, chaired by Dr. Kernodle, funded by two-year appropriations, made a report to the Legislature that

included several population-specific recommendations such as greater cervical cancer screening of older women and the formation of a statewide committee to coordinate cancer control activities in the state.

Drs. Kernodle and Spurr and many of their colleagues saw the need to coordinate cancer control efforts to the optimal benefit of the state's citizens. A cervical cancer task force was formed to bring together leaders from the cancer control programs active in North Carolina in the early 1990s. The benefits were many: there was the American Cancer Society working alongside large community hospitals and medical schools; there were federally funded cancer control activities at the state's three NCI-designated Comprehensive Cancer Centers; there was CDC funding for breast and cervical cancer screening by the state health department.

In 1993, the creation of a "commission" to coordinate cancer control in NC led the cancer legislative agenda. The result was the North Carolina Advisory Committee for Cancer Control and Coordination [NCACCCC]. The Committee comprised representatives from the state's medical schools, cancer centers, professional societies, businesses, the lay public (specified as cancer survivors), and six elected legislators (three from each house). This design conformed exactly to the national "blue print" strategy for comprehensive cancer control. The new organization convened for the first time in January 1994, and four subcommittees were formed: Prevention, Early Detection, Care and Legislation/Education.

The original six legislative members of the ACCCC, Senators Ollie Harris, John Codrington and Fountain Odom, and Representatives Walter Dickson, James Bowman, and Tom Wright, were determined to name their subcommittee "Legislation and Education." Legislation was a clear focus for the group, but they decided that the members of the General Assembly needed meaningful education because of the considerable complexity the Committee members saw in the process of cancer control.

As the first cancer control plan was being developed, the Legislative and Education Subcommittee sponsored six regional education seminars to promote grass-roots recognition of cancer control programs and to connect motivated citizens with their local elected officials. Next, the Subcommittee held an educational forum at the General Assembly to introduce legislators to the breadth and complexity of cancer control. At a luncheon seminar, prominent speakers from the state's medical schools emphasized the merits of early detection, and the need for public education about cancer risk and healthy behaviors like nutrition, and cancer screening.

The Current Perspective

Among the earliest legislative efforts of the Advisory Committee were expansion of the CCR so that it could collect

details of cancer treatment, and obtaining funds with which to implement the directives given the Advisory Committee (See 1995 and 1996 bills in the Table). In 1996, when the first NC Cancer Control plan was unveiled, the Legislation and Education Subcommittee organized a luncheon seminar for legislators. It focused on access to state-of-the-art cancer care, and the great potential for surviving cancer. Legislators heard presentations from cancer survivors, national spokespersons, and legislative leaders, each acknowledging the milestone represented by North Carolina's cancer control plan.

The first cancer control plan described a five-year timetable (1996-2001) for coordinating disease control efforts of immense diversity (public education, professional training, disease screening, promotion of participation in clinical trials). Many local organizations pledged to promote and implement these activities. The prodigious accomplishments made under this plan were described to the legislature at the end of the 2001 session, coincident with the unveiling of the second statewide plan for calendar years 2001 to 2006.

During the five-year period covered by the first cancer control plan, North Carolina received federal funds for implementation of its comprehensive cancer control plan. Money was devoted to education about skin cancer risk, promotion of early cancer detection, screening for colorectal cancer, and for data analyses of high-risk populations. The North Carolina Cancer Control plan was touted nationally as a model.

Over the years, the Legislative and Education Subcommittee has had a number of different members, and it has undertaken several different initiatives, but its unswerving dedication to providing cancer care for specific populations and access to state-of-the-art care for all has remained. The promotion of cancer care has led to introduction of legislation related to insurance coverage for clinical trials, the most "cutting-edge" care available (that legislation is pending). Protecting patients' rights has become a prominent issue because insurance companies may now want to use genetic markers to identify (and discriminate against) patients at high risk of cancer.

Now we are in a time of fiscal challenge, and once again we face the issue of assuring care for all women found to have early cervical cancer—and also breast cancer. The national program for breast and cervical cancer screening has recognized the need to provide care for the indigent patients identified by early cancer detection programs. Federal Medicare funding has been authorized for these women, but it requires a 3:1 state match. As the Table shows, appropriation of matching funds led the legislative priorities for this past session.

As the 21st century starts, a *National Dialogue on Cancer* has begun to promote policies and legislation for cancer control. Prominent among this group's recommendations is a program of coordinated education for state legislators. And

as the new century begins, North Carolina implements its second statewide plan for cancer control; the new five-year period will, we hope, bring us one step closer to reducing cancer-related morbidity and mortality in this state.

Acknowledgment: The members of the Legislative and Education Subcommittee of the North Carolina Advisory Committee for Cancer Coordination and Control made the accomplishments outlined in this paper possible through their unswerving devotion to cancer control in North Carolina. We appreciate their personal sacrifices and the dedication that achieved these milestones: Representative Martha Alexander, Senator Robert Carpenter, Senator John Codrington, Representative W.W. 'Dub' Dickson, Representative Zeno Edwards, Senator Ollie Harris, Representative Julia Howard, Senator William Martin, Senator Fountain Odom; Representative Thomas Wright and many supportive members from both houses of the General Assembly.

In addition, we acknowledge the efforts of Dr. Rebecca Martin, staff member to the committee for several years; Ms. Jane Pinsky, who has worked closely with the Legislative and Education Subcommittee; and Dr. Leah Devlin, who currently acts as staff for the Legislative and Education Subcommittee. We also acknowledge the contributions to these accomplishments by Marion White, formerly Executive Director, North Carolina Cancer Control and Coordination Committee. We wish to recognize the contributions of the late Drs. John Kernodle and John Spurr, who paved the way for these achievements. Finally, we acknowledge the other members of the ACCCC, including the first Chairman, Secretary Jonathan Howes, and the current ACCCC Chairman, Dr. Joseph Pagano, for their substantive efforts on behalf of cancer control policy and legislative advances in North Carolina.

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Results From the 1999 North Carolina Youth Tobacco Survey

A Call To Action

Elizabeth Conlisk, PhD, Sally Herndon Malek, MPH

Statewide data on tobacco use by youth are essential to designing and evaluating youth tobacco control programs at the state level. In the fall of 1999, the NC Department of Health and Human Services, in collaboration with the NC Department of Education and the Centers for Disease Control, asked 12,576 randomly chosen North Carolina students in grades 6-12 about tobacco use. This report summarizes the major findings from that survey. When possible, data are compared to published results from the National Youth Tobacco Survey,¹ which used the same questionnaire, sampling period and sampling methodology as the North Carolina Survey.

Methods

The North Carolina Youth Tobacco Survey used a two-stage cluster sample design to produce a representative sample of middle school (grades 6-8) and high school (grades 9-12) students within each of North Carolina's three regions (Coastal, Piedmont, and Mountain). The piedmont com-

prised Surry, Wilkes, Caldwell, Burke, McDowell, Rutherford, and Polk counties on the west; Warren, Franklin, Wake, Lee, Moore, and Richmond counties on the east; and all counties in between. The coastal and mountain counties were those to the east and west of the piedmont, respectively.

In the first of the two sampling stages, all public schools (including charter schools) that included at least one grade between 6 and 12 were eligible, and the probability that schools would actually be selected was proportional to school enrollment size. In the second stage, second-period classes in each school were chosen based on systematic equal probability sampling. An average of three second-period classes was sampled at each school. All students in the sampled classes were eligible to participate in the survey, except those who are routinely exempt from written tests because of language or learning barriers. Across the state, 98% of selected middle schools (134 of 137) and selected high schools (132 of 135) participated in the survey (Table 1); 90% of middle school students and 88% of high school students enrolled in the sampled classes completed the survey. Nonparticipation was primarily due to absenteeism. The overall response rate was

Table 1. Survey response rates by school level and region

	Middle schools				High schools			
	Coastal	Piedmont	Mountain	Total	Coastal	Piedmont	Mountain	Total
No. of schools sampled	49	49	39	137	48	50	37	135
No. of schools participating	48	48	38	134	47	48	37	132
School response rate	98%	98%	97%	98%	98%	96%	100%	98%
No. of students sampled	2,232	2,405	2,047	6,684	2,821	2,405	2,202	7,428
No. of students participating	2,010	2,175	1,831	6,016	2,481	2,178	1,901	6,560
Student response rate	90%	90%	90%	90%	88%	91%	86%	88%
Overall response rate	88%	89%	87%	88%	86%	87%	86%	86%

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88% for middle school and 86% for the high schools. Response rates at the school and student levels were nearly identical for all regions. The final sample consisted of 6,016 middle school students and 6,560 high school students. All questionnaires were completed between September and November of 1999.

The self-administered, 72-item questionnaire asked questions on tobacco use, exposure to environmental tobacco smoke, access to tobacco, enforcement of legal restrictions, and desire to quit tobacco use. A weighting factor was applied to each response to reflect the likelihood of sampling each student and to compensate for differing patterns of non-response. Software for the Statistical Analysis of Correlated Data² (SUDAAN) was used to compute variance estimates and 95% confidence intervals; differences between subgroups were considered statistically significant if their confidence intervals did not overlap (that is, $p \leq 0.05$). Ethnicity was based on respondents' self-report and was categorized as black (non-Hispanic), white (non-Hispanic) and Hispanic. There were too few respondents from other ethnic groups to support analyzing their response separately. Students were categorized as urban if their school was located in a county with a population density greater than 7,190 per square mile. Current tobacco use was defined by self-report of use within the past 30 days. Tobacco products included cigarettes, smokeless, cigars, and pipes.

Results

Nearly one-fifth (18%) of middle school students reported that they had used a tobacco product in the previous 30 days (Table 2). This percentage was significantly higher for boys (21%) than girls (16%). Current tobacco use almost tripled between 6th and 8th grades, rising from 11% to 27%. The slight differences in percentages of tobacco use observed—for blacks and Hispanics compared to whites, for rural students compared to urban, and for coastal compared to piedmont and mountain regions—were not statistically significant.

Among high school students, 38% reported current tobacco use (Table 2). As with middle school students, current tobacco use was significantly higher for boys (44%) than girls (32%) and increased with grade, from 35% among 9th graders to 45% among 12th graders. In contrast to the data for middle school students, current tobacco use by white students (43%) was significantly higher than for black students (29%). Current tobacco use among Hispanics (34%) was considerably lower than for whites; however, because of the small number of Hispanic students (374), the difference did not reach statistical significance. Differences noted between urban and rural communities and region of the state were not statistically significant.

NC data on current use of specific tobacco products are

Table 2. Percentages of North Carolina students reporting current tobacco use

	Middle school	High school
Total	18.4%±2.3	38.3%±2.2
Boys	21.0%±3.1*	44.0%±2.6*
Girls	15.7%±2.1	32.4%±2.6
Black	19.8%±3.5	28.7%±3.5
Hispanic	20.5%±4.6	33.9%±6.6
White	16.8%±2.4	42.5%±2.7*
6 th Grade	10.6%±1.8	
7 th Grade	17.3%±2.8	
8 th Grade	27.3%±4.3*	
9 th Grade		34.5%±3.0
10 th Grade		35.5%±3.2
11 th Grade		41.8%±4.5
12 th Grade		45.2%±3.7
Urban	15.8%±3.2	35.2%±3.3
Rural	20.2%±3.4	41.2%±3.2
Mountain	17.4%±3.3	42.0%±4.1
Piedmont	17.5%±3.2	37.0%±3.2
Coastal	20.2%±3.5	40.0%±3.1

* $p < 0.05$ compared to others in group

Table 3. Current tobacco use in North Carolina compared to the nation

	North Carolina	United States
Any tobacco		
Middle school	18.4%±2.3*	12.8%±2.0%
High school	38.3%±2.2%	34.8%±2.7
Cigarettes		
Middle school	15.0%±2.2*	9.2%±1.6
High school	31.6%±2.2	28.4%±2.2
Smokeless tobacco		
Middle school	3.9%±0.9	2.7%±0.7
High school	7.9%±1.5	6.6%±1.6

* $p < 0.05$ North Carolina vs US data

compared to published data from the national Youth Tobacco Survey¹ in Table 3. Middle school students in North Carolina were 1.44 times more likely to report current tobacco use than their national peers; they were 1.63 times more likely to report smoking a cigarette and 1.44 times more likely to report using smokeless tobacco in the past 30 days. Table 3 also shows that current use of these products among

high school students also was higher in North Carolina, but the differences were not as dramatic (ratios of 1.10-1.20).

The analysis of responses to questions about stated desire to quit smoking was restricted to the subsample of students in North Carolina and in the nation who were current smokers (Table 4). In general, differences between middle school and high school, and between the North Carolina and the national samples of students, tended to be minor. Approximately half in each subgroup of current smokers reported that they wanted to quit smoking completely, and approximately half reported that they had seriously tried to stop smoking within the past year. Nevertheless, well over 80% of the current smokers in each subgroup believed that they could quit if they *really* wanted to. The only notable difference between the North Carolina data and national data is that North Carolina high school students were significantly less likely than their national peers to report serious quit attempts within the past year (47% versus 56%, respectively).

Discussion

Our data provide the most comprehensive look to date at tobacco use among North Carolina youth. A major strength of the present survey was the representativeness of the sample. In addition to the large number of subjects, nearly 98% of the 275 randomly chosen schools agreed to participate. The overall response rate was 88%, the highest published response rate of any state that has conducted the Youth Tobacco Survey.¹ Thus, biases introduced by failure of response have been minimized in this survey.

The major limitations of this and all school-based tobacco surveys are that students who attend private schools and youth who have dropped out of school are not included, and that all data are based on self-report. Thus, the inferences drawn from the data are only applicable to youth who attend public schools and are only as valid as the self-reported responses. Whether students differentially underestimate or overestimate tobacco use is not clear, and might vary by grade and other demographic factors.

The most alarming finding of the survey is the high rate of current tobacco use, particularly cigarette smoking, among middle school students in North Carolina compared to the nation. In a 1999 telephone survey of adults, current cigarette smoking in North Carolina (25%) was found to be 1.1 times

that of the US (23%).³ We found that North Carolina high school students were 1.1 times more likely to report current use of cigarettes than their national peers, but middle school students were more than 1.6 times more likely to report such use. It is possible that these ratios reflect long-standing patterns of age-specific cigarette use in North Carolina versus the nation—that is, North Carolinians start smoking at earlier ages than their national peers, but they are only slightly more likely to smoke as adults. This argument is not entirely convincing; it is possible that the high relative use of tobacco by NC middle school students signifies a new and worrisome trend in smoking in North Carolina relative to the nation. If the elevated rates observed in this middle school cohort persist into high school and into adulthood, then North Carolina might soon be leading the nation in smoking among adults.

The finding that 18% of middle school students and

38% of high school students currently use tobacco requires immediate attention. Almost 80% of adult smokers begin smoking as teens, and the age at which they begin is inversely associated with the likelihood of their smoking as adults.⁴ In our sample, over half of current smokers report that they would like to quit, and half have seriously tried in the past year but have failed. Despite this

track record of failure, more than 80% persist in believing that they *could* quit if they really wanted to. Our data underscore the need for teen-based tobacco prevention, control, and cessation programs such as that in Florida, which has been associated with a 41% decline in cigarette use among middle school students.⁵ The data also highlight the need for continued monitoring of youth tobacco use through the comprehensive, representative, and standardized Youth Tobacco Survey.

Acknowledgment: The authors would like to thank the Safe and Drug-Free School Coordinators and school administrators and teachers in participating schools for their exemplary efforts in administering this survey.

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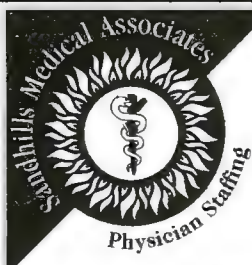
Table 4. Attitudes of current smokers about smoking cessation

	North Carolina	United States
Want to completely quit		
Middle school	53.4%±5.1	50.9%±7.0%
High school	51.2%±3.5	54.4%±3.1
Seriously tried to quit in past year		
Middle school	56.0%±5.5	57.9%±3.6
High school	46.8%±2.9*	55.6%±2.3
Believe they could quit if really wanted to		
Middle school	82.3%±3.5	81.7%±4.3
High school	81.9%±2.6	83.7%±2.4

*p<0.05 North Carolina vs US data

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Teen Empowerment Movement to Prevent Tobacco Use by North Carolina's Youth

Jim D. Martin, MS, Kurt M. Ribisl, PhD, Delmonte Jefferson, Ann Houston, CH-ES

Tobacco use is the number one preventable cause of premature death and disease in North Carolina and the nation.^{1,2} Tobacco use causes more than 14,500 deaths every year in this state (21% of deaths overall).³ Tobacco use almost always begins during the teens. More than 80% of current adult tobacco users started before they were 18 years old.² It is therefore worrisome that the rate of tobacco use by teenagers has increased in North Carolina during the last six years, and that the rates of tobacco use among middle and high school students in North Carolina are higher than national averages (see article by Conlisk and Malek on page 256).⁴

In order to prevent and control tobacco use, North Carolina has recently adopted a comprehensive plan that involves multiple strategies targeted at *both* youth and adults.⁵ The Tobacco Prevention and Control Branch of the NC Department of Health and Human Services, in collaboration with public and private organizations across the state, is implementing the plan, based on the Centers for Disease Control and Prevention (CDC) "Best Practices for Comprehensive Tobacco Control Programs,"⁶ and tailored specifically to this state. The plan's four major goals are to

- ◆ Prevent the initiation and promote the quitting of tobacco use by youths;
- ◆ Eliminate exposure to environmental ("second-hand") tobacco smoke;
- ◆ Promote the quitting of tobacco use by adults;
- ◆ Lessen the health disparities incurred by vulnerable and under-served racial, ethnic, and income groups that are disproportionately affected by tobacco use.

North Carolina is taking a number of steps at the state level to augment existing programs and to provide new resources needed by youth leaders, schools, and communi-

ties. In this article we document North Carolina's efforts to reduce teen tobacco use, focusing specifically on how teen empowerment programs aim to change policies and social norms surrounding the use of tobacco products. The Tobacco Prevention and Control Branch is helping organize and empower young people to work effectively with adults to prevent youth tobacco use in North Carolina. The plan's major policy and program objectives are to

- ◆ Increase the number of North Carolina school districts that are 100% free of tobacco use by all people in all school buildings, on the campus, and at school-related events;
- ◆ Reduce illegal sales of tobacco products to minors at retail stores and vending machines;
- ◆ Increase the number of smoke-free public places, work places, recreational sites, restaurants, and homes.
- ◆ Increase the number of health-promoting cues and messages provided by media.

The Perspective of Youth Empowerment

In the early 1960s smoking prevention programs aimed at youth listed the negative effects of smoking and gave gruesome portrayals of diseased organs; later efforts focused on improving self-esteem, refusal skills, and resistance to influence from peers, the media, and other social factors.^{7,8} Despite the proliferation of such programs, the prevalence of current cigarette smoking among US high school students rose from 27.5% in 1991 to 36.4% in 1999.⁹ It seems that traditional curriculum- and classroom-based youth smoking prevention programs are not very effective,¹⁰ and this has led to the active pursuit of alternative approaches.

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Youth development and empowerment constitute one of the newest and most promising methods.^{7,11} Empowerment means helping people develop skills to become independent problem-solvers and decision-makers. It refers to the process by which individuals gain influence over events and outcomes of importance in their environment.¹² For brevity, we will refer to these programs hereafter as youth empowerment programs. These new programs challenge the tenets of the older programs because they view young people as assets rather than as the sources of the problem, and because they actively engage youth in finding solutions.^{7,11} This means youths serve not merely as the target audience, but become actively involved in developing, implementing and evaluating interventions.

Legal settlements with tobacco companies have provided funds allowing states like Mississippi and Florida to branch out from traditional health-class lessons to work actively with youth groups to create social change. Last year, for example, high school students with Mississippi's "Question It" Youth Campaign helped push through the state legislature a bill prohibiting the use of tobacco at school and school-related athletic events. The empowered students testified before committees, talked to lawmakers, and galvanized support state-wide. Florida used its funds to support a statewide program empowering youth to lead community involvement against tobacco.¹³ Meaningful youth participation was assured by the stipulation that at least 25% of the members of the state's 67 Community Partnerships be youths, and by convening a Teen Tobacco Summit at which teens created a youth advocacy group called SWAT (Students Working Against Tobacco). Launched in Spring of 1998, SWAT quickly grew from 457 to over 10,000 members by the Fall of 1999.^{13,14} Since beginning its tobacco control program in 1998, Florida has had the largest decline in youth smoking seen anywhere in the US over the past two decades.¹⁵ The decline was the result of several factors: increased program funding, increased cigarette prices, and individual programs such as SWAT and other youth cessation efforts.

Early Teen Empowerment Efforts in North Carolina

North Carolina's tobacco prevention and control programs have been given a tremendous boost through initiatives that involve youths as leaders. The Tobacco Prevention and Control Branch and its partners have built upon successful youth leadership initiatives of the local American Stop Smoking Intervention Study (ASSIST) coalitions, the Health Action Council of the American Lung Association and American Cancer Society, and the African-American Action Team. These programs have advanced the notion that solving a complex problem like youth tobacco use requires many

partners and a strong peer-led youth movement. The efforts must be sustained by schools and community groups, and by funders and decision makers who understand the need for culturally competent commitment and support. Youth-led initiatives in North Carolina build upon model student-led programs such as Students Warning Against Tobacco from Independence High in Charlotte, Watauga High Against Tobacco, the African-American Action Team program called UJIMA (a principle of Kwanzaa to encourage collective work), and the Smoke-Free Class of 2000 that evolved into Teens Against Tobacco Use, a peer education and youth advocacy program led by the American Lung Association and the American Cancer Society.

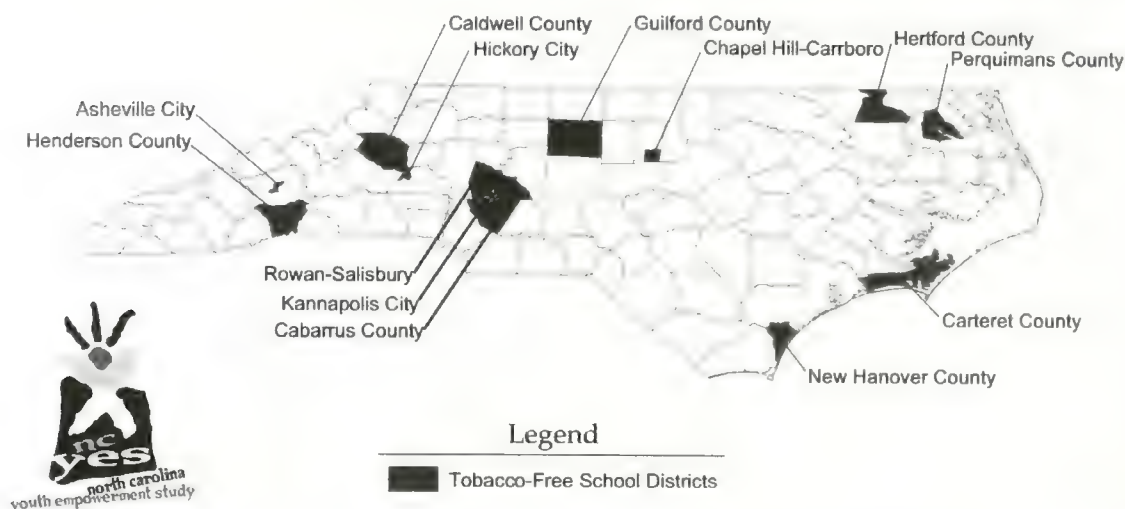
The Governor's Summit

In January 2000, more than 800 students, teachers, and school and public health officials gathered in Charlotte for the state's first Governor's Summit to Prevent Teen Tobacco Use. The Tobacco Prevention and Control Branch was able to convene delegates representing the racial and ethnic populations of North Carolina, nonsmokers and smokers, youth and adult leaders. The Summit created a forum to showcase various youth initiatives, and to focus on goals and strategies to prevent North Carolina teen tobacco use. Youth and adult delegates made it clear that strong action was needed immediately. To communicate an effective message of prevention to young people, North Carolina had to empower one of its most valuable resources in the fight against teen tobacco use—its teenagers. This meeting was the largest public health training event in North Carolina history—quite an accomplishment for a state that is the leading grower and manufacturer of tobacco in the United States.

Teen Empowerment Activities

Promoting 100% Tobacco-Free Schools. During the Summit, a group of committed teens developed a petition calling on state and local leaders to support 100% tobacco-free schools. At the time of the Summit, about 5% of school districts in North Carolina were 100% tobacco-free, compared to over 97% of districts in California.¹⁶ The students printed copies of the petition so that all Summit participants could solicit supporting signatures back at their local schools. As a direct result of the summit, 18 student leaders agreed to serve on the Governor's Youth Advisory Team on Preventing Tobacco Use Among Young People. In February 2000, the Youth Advisory Team delivered to then-Governor Jim Hunt a petition with more than 1,800 signatures asking for 100% tobacco-free schools. In response, the Governor sent a letter to every middle and high school principal,

Figure 1. North Carolina School Districts with 100% Tobacco-Free School Policies, May 2001.



superintendent, school board chair, and PTA asking that schools, school grounds, and all school-related events be made 100% tobacco-free. To support these efforts, the Tobacco Prevention and Control Branch published a *Grassroots Guide for Tobacco-Free Schools in North Carolina*, which was distributed to all public schools in the state.

In the year after the Summit, the number of school systems that are tobacco-free has doubled. This is exciting progress, but much more needs to be done. Currently, only 13 of 116 school districts have adopted a 100% tobacco-free school policy (Figure 1), but many are in the process of strengthening their current smoking policies. Efforts to promote 100% tobacco free schools continue; on March 14, 2001, Governor Michael F. Easley and State Superintendent of Public Instruction Mike Ward sent a letter to all school districts encouraging them to implement a 100% tobacco-free school policy.

The Tobacco Prevention and Control Branch offers training and technical assistance for the tobacco-free schools model. This includes the components recommended by the CDC for preventing and reducing tobacco use in school populations (such as the 100% tobacco-free policies already discussed) and encourages districts to adopt additional measures such as (1) offering alternatives to suspension for students who violate the school's tobacco use policy; (2) offering cessation programs for students and staff who want to quit; and (3) promoting student-led school-wide programs and activities setting a tobacco-free norm.

Reducing Youth Access To Tobacco Products. The Federal Synar Amendment (Section 1926 of the Public Health Service Act) requires states to reduce youth access to tobacco products. The NC Division of Alcohol Law Enforcement (ALE) enforces the state's laws on youth access to tobacco. Active enforcement, combined with merchant education, is the only proven way to reduce youth access to tobacco products.¹⁷ In many North Carolina communities

merchant education is conducted by youth organizations, many of whom have received training through the UJIMA program. Since 1996, the combination of enforcement activities by ALE and merchant education has reduced by 50% the rate at which minors can buy tobacco products in North Carolina. Unfortunately, current lack of funds for active statewide enforcement threatens the State's ability to continue to reduce tobacco sales to minors.

Promoting Smoke-Free Air. Secondhand smoke is a known human lung carcinogen and a serious threat to the health of children. Secondhand smoke both causes and exacerbates asthma,¹⁸ a leading cause of school absenteeism. Almost half of NC middle school students (49%) and high school students (46%) live with someone who smokes. North Carolina law (GS 143-595, *Smoking in Public Places*) requires that 20% of the space in state-controlled buildings be set aside for smoking, and prevents local governments from setting more stringent limits. Despite this preemptive law, there has been a 77% increase in North Carolina workers covered by nonsmoking policies, because organizations have passed *voluntary* private policies in response to the increased understanding of the serious health threat from secondhand smoke and a growing demand from employees and customers. The community coalitions funded through the Tobacco Prevention and Control Branch have worked effectively with teen leaders to promote voluntary clean indoor air policies for restaurants, worksites, and family-oriented businesses. Meaningful progress in eliminating environmental tobacco smoke requires that teen empowerment efforts be combined with strong state and local community leadership. Furthermore, core funding of state and local collaborative activities is needed to promote adoption of nonsmoking policies in homes, daycare facilities, schools, workplaces, restaurants, and public places.

Pro-Health Media Messages. In December 2000, the Tobacco Control and Prevention Branch launched a teen-

focused radio campaign that engaged teen members of the Governor's Youth Advisory Team to tell their stories of successful advocacy. The objectives of the media campaign in North Carolina were to

- ◆ increase the level of youth advocacy in preventing tobacco use;
- ◆ increase credibility of and support for tobacco-free schools;
- ◆ reward young leaders in preventing tobacco use.

Funds for the radio campaign were secured from the Advisory Committee for Cancer Coordination and Control and The Robert Wood Johnson Foundation. The interviews focused on 100% tobacco-free school policies and youth-led tobacco prevention activities. Through these ads, teens encouraged their peers to "StepUp" (a term that became the name of the media campaign) and get involved in policies and programs to prevent teen tobacco use. From December 2000 to January 2001, the radio campaign was aired across the state on 15 teen-oriented radio stations at times targeted for youth audiences. The ads also ran as Public Service Announcements during February-March, 2001.

A website, www.StepUpNC.com, was activated at the start of the radio campaign. The radio ads directed listeners to the website, which contained both audio files of the commercials and links to webcasts from the participating stations. The site itself has many sections that encourage youth advocacy (such as efforts to promote tobacco-free school policy) and interaction among teens.

Expanding the Youth Empowerment Movement

As part of the new strategy to empower teen advocates, the Tobacco Prevention and Control Branch secured two grants. The Robert Wood Johnson Foundation awarded a three-year grant to enhance North Carolina's statewide effort to reduce teen tobacco use by establishing three Tobacco Use Prevention Youth Empowerment Centers. The teens involved with these centers named their initiative the "Y Youth Empowerment Program." Additional funding came in March, 2001 in the form of a three-year grant from the American Legacy Foundation, a national foundation established through the Master Settlement Agreement between the tobacco companies and 46 states. North Carolina and 12 other states received such grants. Funds from these two sources will help expand the State's youth empowerment efforts in local schools and communities, and focus on racial and ethnic groups most affected by tobacco use.

Y Youth Empowerment Centers. There are three Y Youth Empowerment Centers located throughout North Carolina, and each is staffed by a Project Coordinator and five to ten skilled youth advocates. Some of those selected for these positions were chosen because they were already in-

involved in tobacco prevention and control, and others because of a desire to change the social acceptability of tobacco use. In addition to the staff involved in tobacco advocacy efforts at the local level, the Tobacco Prevention and Control Branch has two youth leaders who staff the Youth Empowerment Project at the state level. The two people in these positions are 18 and 19 years old, and they have been involved in tobacco prevention and control for at least six years. North Carolina has incorporated youth in both its strategic planning and decision-making efforts.

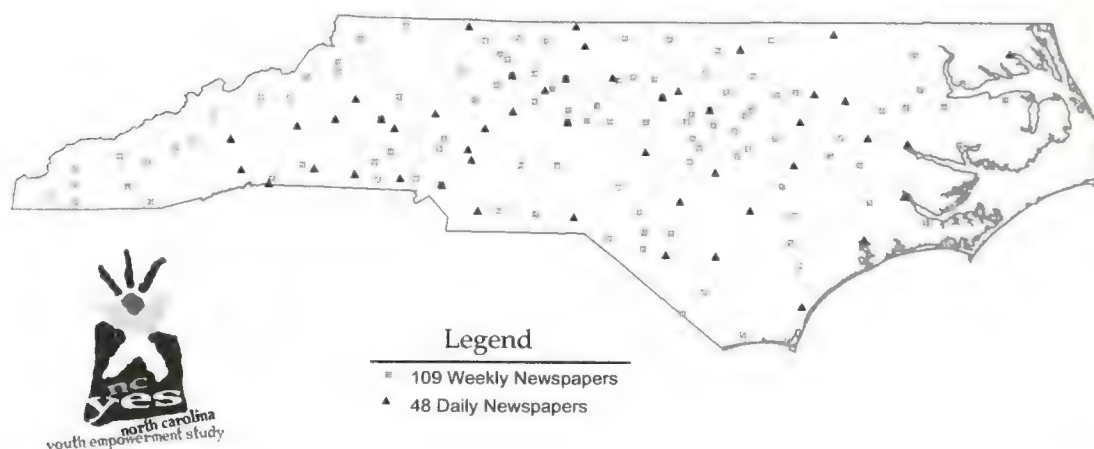
The eastern youth center is located at the Wilmington Health Access for Teens (WHAT) in Wilmington, the central youth center at the Durham Youth Center in Durham, and the western youth center at the Buncombe County Health Department in Asheville. These sites were chosen because of their ability to demonstrate youth advocacy and involvement in changing the social norms of tobacco use through media and community interventions. Each center has a proven track record of working with youth in health-related areas and a strong interest in tobacco use prevention and control. Working with existing Tobacco Prevention and Control Branch coalitions, the centers will use media advocacy and counter-marketing to strengthen involvement and leadership in tobacco use prevention among diverse youth. In collaboration with statewide and community stakeholders, they will use innovative media and policy advocacy strategies to affect policies and social norms surrounding tobacco use.

So far, each center has been involved in infrastructure development and organizational design as well as community assessment and strategic planning. They are offering mini-grants to other organizations in each region to further the center's goals. The next step will be the implementation of activities to support their goals and objectives, and an ongoing evaluation and refinement of their community model. This youth-led, adult-supported model of advocacy and involvement will set an example for other states to follow.

Evaluation of Youth Empowerment Efforts

Currently, few published studies have examined whether teen empowerment programs achieve their tobacco control objectives. To stimulate research in teen empowerment, the American Legacy Foundation funded a competitive grant submitted by the UNC Prevention Research Center to evaluate the impact of teen empowerment activities in North Carolina. The project, the North Carolina Youth Empowerment Study (NC YES), uses a participatory evaluation approach, which differs fundamentally from traditional evaluation. NC YES *involves* participants rather than distancing them from program evaluation.^{19,20} This new evaluation process complements youth empowerment approaches by actively engaging youth in evaluation. NC YES has established an 18-member Advisory Board comprising equal

Figure 2. Daily and Weekly Newspapers monitored for coverage of youth tobacco issues by the North Carolina Youth Empowerment Study (NC YES)



numbers of teen and adult leaders from across the state. It will actively shape the direction of the evaluation. By involving program participants in evaluation efforts, the youth and adults will develop their own evaluation knowledge and skills and thus become further empowered.

Another innovative component of the NC YES project is that it takes a comprehensive approach to evaluating the impact of teen empowerment programs. The study will examine the impact of teen empowerment activities upon *individual* teen participants, examine whether and how the groups serve as empowering organizations, and assess the impact of the groups on objectively measured community-level indicators such as policy development and media coverage of tobacco issues.

For the policy development component, NC YES will focus on school tobacco use policies. Through telephone interviews with key informants (superintendents, principals, teachers, students, and leaders of teen empowerment programs) in each school district that is 100% tobacco-free, the researchers will assess what role, if any, teen empowerment programs played in getting the policy passed. Aside from documenting the role of the teen empowerment groups, the interviews also assess the process of implementing, and enforcing, school tobacco policies. In the process, NC YES will update a database of all school district tobacco use policies, which was originally collected by the NC Department of Public Instruction.

The goal of the NC YES media tracking study is to assess whether youth empowerment programs in North Carolina garner greater amounts of media coverage in daily newspapers than similar programs in other tobacco-growing states. Media coverage was used as an evaluation indicator in the American Stop Smoking Intervention Study; newspaper stories on tobacco issues in ASSIST states were clipped and analyzed to provide unbiased and non-intrusive indicators of community-level program impact.²¹ North Carolina was an

ASSIST state, and showed significant changes in media coverage over the course of the study; pro-health newspaper articles, editorials, and letters to the editor increased from 20% in 1991 to 70% in 1999, while pro-tobacco newspaper coverage decreased from 22% to 5%. To continue these positive changes, youth across NC will be trained in media advocacy techniques by the Tobacco Control and Prevention Branch and the ?Y Youth Empowerment Centers. The NC YES researchers hypothesize that there will be a significant increase in earned media coverage of teen empowerment programs, events and issues. NC YES will not assess paid media coverage (advertising space).

NC YES has hired a service to clip all newspaper articles pertaining to youth empowerment programs in the 157 daily and weekly newspapers published in North Carolina (Figure 2). For comparison, the research project will gather clipped articles from two control tobacco-growing states, Virginia and Georgia. The identified articles will be rated by trained observers using characteristics identified previously²¹⁻²³ as important: prominence (front page, column inches, accompanying photo), topic area (youth access, environmental tobacco smoke, advertising or marketing), focus of article (community event, passage of policy), and slant (positive, negative, or neutral portrayal of teen empowerment). The researchers will use time series analyses of the number of articles published monthly over a three year period to test the hypothesis that teen empowerment programs generate more articles in North Carolina than in control states.

Summary

Strong youth and adult leadership and exemplary policy and program interventions put a unique synergy to work in North Carolina. The state aspires to be a model for the nation in overcoming barriers related to tobacco use prevention by

empowering its greatest resource—youth. New grant funding is building the foundation for youth empowerment programs, and increased and sustained funding is being sought to significantly expand these efforts. Youth speak with a fresh voice, bringing energy and conviction, as well as non-traditional ideas and strategies to the achievement of their goals. By changing public opinion and influencing the actions of leaders in the nation's leading tobacco state, the North Carolina Tobacco Prevention and Control Branch will develop leadership for tobacco use prevention that will serve the entire nation.

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Labored Breathing

Policies to Eliminate Environmental Tobacco Smoke Exposure in North Carolina

Adam O. Goldstein, MD, Sally Herndon Malek, MPH, Anne Y. Butzen

Tobacco use is the leading cause of preventable death in North Carolina. Each year it leads to over 13,000 deaths, and over \$400 million in health care costs.¹ Environmental tobacco smoke (ETS) exposure occurs when nonsmokers inhale tobacco smoke generated by others. ETS is a major health problem in the US and North Carolina. In this article we summarize scientific knowledge about ETS exposure, exposure levels in North Carolina, the attitudes of North Carolina citizens and policy-makers about ETS, current efforts to extend protection from ETS, barriers to protection, and suggested future directions for policy activity.

The Science of Environmental Tobacco Smoke

ETS is classified as a human lung carcinogen by the Environmental Protection Agency. It causes at least 3,000 cases of lung cancer among nonsmokers every year in the U.S.² Smoke from an idling cigarette contains nearly twice as much tar and nicotine, up to five times more carbon monoxide, and 50 times more ammonia than smoke that is directly inhaled.³

Among the toxic constituents of ETS are carbon monoxide (which leads to heart disease and fetal damage), nitrogen oxide (leading to nitrosamine formation and cancer), ammonia (a respiratory and eye irritant), methylnitrosocyanate (a lung poison), hydrogen cyanide (the lethal gas used in execution chambers) and nicotine. ETS contains over 40 cancer-causing agents,³ including benzo [a] pyrene (a cause of lung cancer), nitrosamines (lung and respiratory tract cancer), aromatic amines (cancer of bladder and breast),

benzene (leukemia), formaldehyde (nasal cancer), and radioactive polonium-210.³

Scientific evidence about the health effects of ETS has been building for more than 30 years. In the 1970s, US government reports showed that "an atmosphere contaminated with tobacco smoke contributes to the discomfort of many individuals"; in 1986, the Surgeon General reported on the dangers of involuntary exposure to ETS and recommended strong action to limit exposure.⁴ In 1991, the National Institute of Occupational Safety and Health said that "employers should protect nonsmokers from ETS by isolating smokers" and reducing exposure to the lowest feasible concentration.⁵

The yearly number of ETS-related cardiovascular deaths exceeds the number of ETS-related lung cancer deaths by a factor of 10-20.³ There are 4,000 heart disease deaths and more than 400 lung cancer deaths annually among office workers exposed to ETS in the workplace.⁶ Exposure to ETS increases carotid atherosclerosis, even among healthy people, and "some adverse effects may be cumulative and irreversible."⁷ The largest study followed 450,000 nonsmokers from 1982 to 1989. Those exposed to ETS had a 30% higher rate of death from heart disease than those not exposed.⁸ In a comprehensive 1999 review, the National Cancer Institute and the California Environmental Protection Agency concluded that ETS is causally related to many diseases, including cancer and heart disease.³ In total, ETS causes 65,000 deaths a year in the US and approximately 1,500 in North Carolina (Table 1).

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Public Knowledge, Attitudes and Behaviors about ETS Exposure in North Carolina

Public surveys show that North Carolina citizens experience adverse health effects from ETS exposure, that they are aware of ETS-related health effects, and that they want more protection from it (Table 2).⁹⁻¹¹ Approximately 70% of North Carolinians know that breathing ETS is harmful and causes lung cancer.⁹ One out of three North Carolina adults reports that someone smokes tobacco in their home every month. Nearly 30% of working North Carolina adults do not have a smoke-free policy at their place of work.^{10,11} Two-thirds of North Carolina adults with asthma know that their asthma is worsened by secondhand smoke.⁹

A 1996 survey showed that 70% of North Carolinians who are exposed to ETS are exposed by their spouse or life partner.⁹ Twenty percent of newborn babies live in a home with a smoker.¹² A study of airports, shopping malls, roller rinks, and other indoor entertainment facilities revealed that well over 400,000 adults and 100,000 children are exposed to ETS every week in these common public facilities.¹¹ A recent study by the NC Division of Public Health found that nearly 33,000 children in North Carolina had experienced some degree of respiratory distress.¹² Sixty-five percent of asthmatics describe a worsening of symptoms after exposure to ETS in the workplace.⁹

Adults in North Carolina strongly support limiting public exposure to ETS (Table 2); 62%-75% of them prefer smoke-free restaurants, feel that businesses should do more to protect employees and customers from secondhand smoke, believe that smoking should not be allowed in some or all indoor work areas, and believe that government should regulate smoking in public places.⁹ Business owners and managers agree that ETS exposure is a public health problem, that it causes heart disease and lung cancer, and that their facilities should be smoke-free.¹¹

Policy Options to Reduce ETS Exposure

Several policies have been proposed to reduce ETS exposure, but some are not viable options. The tobacco industry touts the establishment of designated smoking areas, believing that it is possible to

Table 1. Diseases caused in the US by environmental tobacco smoke exposure³

<i>Diseases</i>	<i>No. of cases</i>
New asthma cases	26,000
Existing asthma exacerbations	1,000,000
Bronchitis/pneumonia	300,000
Hospitalizations in children	15,000
Lung cancer deaths	3,000 (81 in NC)
Heart disease deaths	62,000 (1674 in NC)

"accommodate" smokers and nonsmokers in public places.¹³ The problem is that smoking and non-smoking areas usually occupy the same room. ETS diffuses rapidly throughout the room, resulting in substantial exposure among nonsmokers. More than a quarter (26%) of North Carolinians report that their workplace smoking rules assign designated smoking areas inside their workplace.¹⁰ Because of air re-circulation through central ventilation systems, it is likely that most workers have high levels of ETS exposure at work (each smoker would need about one million square feet of building area to produce minimal safe ETS exposure levels).¹⁴

Another policy proposes separately ventilated areas in public places. When these designated smoking areas do not leak, they adequately protect nonsmokers, but there are two

Table 2. Knowledge, attitudes and behaviors of North Carolinians regarding ETS exposure¹¹

<i>Statements</i>	<i>Those agreeing</i>
<i>Knowledge</i>	
Secondhand smoke can cause lung cancer	70%
Secondhand smoke can cause earaches in young children	35%
Secondhand smoke can cause babies to be born prematurely	66%
<i>Attitudes</i>	
Support smoking restrictions at outdoor sporting events	58%
Support government regulation on smoking in public places	62%
Support restrictions on smoking in restaurants	95%
Feel there should be smoking restrictions in clubs and bars	76%
Feel there should be no smoking at all in schools	88%
Feel the most appropriate workplace policy is no smoking or limit it to outside	82%
Feel there should be smoking restrictions in bowling alleys	90%
<i>Behaviors</i>	
Workers report secondhand smoke-related discomfort (among those exposed)	43%
Prefer to eat in restaurants that are smoke-free	64%
Asthmatics report worsened symptoms around secondhand smoke	65%

concerns: designated smoking areas may actually increase the health risks of smoking; and the installation of separately ventilated smoking lounges is very costly.

Table 3. North Carolina Tobacco Prevention Control Branch ETS policy objectives 2001-2010²⁹

Objectives	Current	Goal for 2002	Goal for 2004	Goal for 2010
Percentage of schools that are completely smoke-free	11%	15%	30%	100%
Percentage of workers in public and private work sites covered by a formal policy prohibiting smoking entirely or limiting it to separately ventilated areas	61%	63%	81%	100%
Percentage of North Carolina citizens reporting completely smoke-free homes	53%	58%	63%	74%
Percentage of middle and high school students who live with someone who smokes	46%	42%	36%	24%

The healthiest and least costly policy option is to eliminate public smoking, and thus eliminate ETS exposure altogether. Workplace smoking bans effectively reduce nonsmokers' exposure to ETS. One study found a strong correlation between airborne nicotine concentrations and workplace smoking policies (median nicotine concentrations fell from 8.6 $\mu\text{g}/\text{m}^3$ in open offices that allowed smoking, to 1.3 $\mu\text{g}/\text{m}^3$ in those that restricted smoking, to 0.3 $\mu\text{g}/\text{m}^3$ in sites that banned smoking.¹⁵

Legislative Policy Options

North Carolina currently has no statewide laws protecting its citizens from ETS exposure. Instead, it has a law (GS 143-597: Smoking in Public Places) stating the legislative intent to "address the needs and concerns of both smokers and nonsmokers in public places by providing for designated smoking and nonsmoking areas."¹⁶ Yet the law does not require smoke-free areas in state government or private work sites, or in restaurants; it does allow libraries, museums, and health care instructional buildings to be "designated as nonsmoking." State controlled buildings, like auditoriums, may establish nonsmoking areas if at least 20% of the interior space (including 20% of lobbies) is designated for smoking unless it is "physically impracticable." And even when areas are designated as nonsmoking or smoking it is not required that existing ventilation systems be modified to reduce or eliminate ETS exposure. The law exempts schools, child care centers, public school buses, hospitals, nursing homes, health departments and nonprofit agencies whose primary purpose is to discourage tobacco use.

Unfortunately, North Carolina's law (GS 143-597) prohibits local governments from enacting any new public health ordinances for clean indoor air.¹⁶ State laws of this

kind are called *preemptive* because they restrict local counties from passing indoor air regulations that are stricter than the statewide clean indoor air law. North Carolina's preemptive legislation was introduced in April 1993 to protect the "rights" of smokers and supposedly to reduce confusion among North Carolinians who might be subjected to smoking regulations in one county and not in another.

When the NC General Assembly passed the law in July 1993, it gave local public health advocates three months in which to pass clean indoor air ordinances, after which all future ordinances were preempted. Public health advocates responded by getting city councils, county commissioners, and boards of health to pass 89 local smoking rules in North Carolina.¹⁷ Most of these regulations were passed by county boards of health, and exempt small restaurants and bars, for fear that prohibiting smoking would impose an unfair economic burden. The speed with which these new local ordinances were passed came at a price: there was little time for local coalitions to educate their communities about ETS as a health hazard and to build outspoken community support for the ordinances that were enacted.¹⁷

In November 1993, lawsuits contesting local smoking ordinances were filed against the Boards of Health in four counties. Buncombe County won its case at the local level; Guilford County, under threat of suit, withdrew its proposed rules; Wake County suspended enforcement of its rules under pressure from restaurants supported by the tobacco industry.¹⁸ The Halifax District Court, in a suit brought by cities and business in the county, ruled that the Halifax County Board of Health ordinance was illegal because it referred to economic impact.¹⁹ The court ruled that the Board of Health had the right to pass only health-related rules, and had erred by taking economic factors into consideration. Smoking regulations were thus made null and void. The ruling was not subsequently appealed, and so all similar

ordinances passed across the state are now in question.¹⁹ North Carolina citizens and public health advocates have few legislative policy options. Since GS 143-597 became fully in effect, no local communities in the state have enacted ETS legislation, and many local rules have been suspended.

Policy options do exist. As suggested by the University of North Carolina Institute of

Government,¹⁹ advocates can bring forth local legislation within the limits of the preemptive law. Federal statutes preempt state law if the two conflict, and people disabled by smoking or secondhand smoke are guaranteed the right to a minimally healthy environment by the Eighth Amendment of the United States Constitution.

Another policy option is to use the complex language of the preemptive law to push for more appropriate standards. For instance, state buildings must set aside 20% of their interior space for smoking areas, unless such a rule is "physically impracticable." Some managers of state controlled buildings have deemed the space too small or ventilation systems inadequate to protect the health of nonsmokers. They could then adopt 100% ETS-free policies.

Day care centers, schools, health care facilities, and persons with disabilities are all protected by Federal law. Schools (both school buildings and school grounds) can have 100% smoke-free policies that apply to students, faculty, and visitors on campus, and apply at all school-sponsored events.²⁰

The legislative policy option that offers the greatest public health gains is the most difficult to achieve: repealing North Carolina's preemptive tobacco law (GS 143-597), or passing a truly protective state clean air measure. It is very difficult to overturn preemptive tobacco laws. Over the last decade, 16 states have passed tobacco industry-sponsored preemptive legislation, and none has successfully repealed the laws. Only Vermont and California have enacted comprehensive clean air legislation. Overturning preemption or passing true clean air legislation will be even more difficult in North Carolina, with its historically friendly relationship between the tobacco industry and the legislature.

Regulatory Policy Options

Some people affected by exposure to ETS have sought regulatory refuge under the Americans with Disabilities Act (ADA), which prohibits places of public accommodation from discriminating on the basis of disability.²¹ Public facilities—courthouses, jails, hospitals, parks, and other facilities owned and operated by State and local governments—

Table 4. North Carolina Tobacco Prevention Control Branch ETS Strategies 2001-2010

- ◆ Educate individuals and organizations on the need for smoke-free policies, the link between asthma and ETS, and smoking in homes
- ◆ Promote policies at schools and work sites to eliminate ETS exposure
- ◆ Meet with owners and managers of facilities that currently allow tobacco use
- ◆ Encourage customers and influential citizens to voice their desires about limiting ETS
- ◆ Conduct paid media campaigns about ETS exposure
- ◆ Promote and support businesses that are smoke-free
- ◆ Promote role models for ETS-free lifestyles
- ◆ Promote in-home inspections and quit-smoking services for families of asthmatics

cannot discriminate in their services because of race, color, religion, national origin or disability. Under the law, a disability is defined as physical or mental impairment that substantially limits one or more major life activities. People with chronic respiratory illnesses such as asthma have filed claims under the ADA, claiming successfully that breathing is one of life's "major activities."

One does not have to hire a lawyer and file a claim to use the ADA. Often it is only necessary to inform an employer about the ADA, whom it protects, the potential publicity generated by claims, and other peoples' successful claims. For instance, the Piedmont Triad International Airport changed its policy on ETS in large part because of public pressure from local groups in Greensboro and SAVE (Survivors and Victims of Tobacco Empowerment Program). SAVE publicized the ineffective policy in place, demonstrated exposure of those with smoke-sensitive medical conditions, and generated substantial publicity. As a result, the Airport authority changed its ETS policy from a permissive one with pervasive exposure to a restrictive policy that confined smoking to separately ventilated, enclosed rooms.²²

Using the ADA to advance ETS policy change can take a long time and may require legal representation in order to expedite the process, but ultimately success is possible. In 1995, three asthmatic children and one adult with lupus brought a case against Burger King and McDonald's claiming that the restaurant chains' policy of allowing smoking in their facilities violated the ADA's public accommodations provisions. A court ruled that a smoking ban in the restaurants "would fully accommodate the plaintiffs' disabilities but impose little or no cost on defendants."²³

Voluntary Policy Options

In addition to strengthening legal regulations, employees, students, consumers, citizens and public health advocates have worked for voluntary policies that prohibit smoking at work sites, recreational facilities, homes, and schools. The percentage of workplaces reported to be smoke-free has risen from 31% in 1993 to 61% in 1999, but North Carolina

workers still lag behind the national average of workplaces protected by a smoke-free environment (68.5% in 1999²⁴). Surveys of restaurants vary, but a recent poll showed that only 25% of restaurants in the state are completely smoke-free (North Carolina Department of Health and Human Services. Unpublished data, 1999). Even North Carolina's schools have seen a slow rise in school districts that have 100% smoke-free policies (from 6% to 11%).

The Future of ETS Policies in North Carolina

Over the last three years, new opportunities for implementing effective tobacco control policies and reducing ETS exposure have emerged in North Carolina. These include (1) revelations about biased research on ETS by the tobacco industry,²⁵ (2) heightened public awareness of adverse health effects of ETS exposure, (3) increased awareness of how the ADA provides opportunities to gain smoke-free accommodations for breathing-impaired people, (4) increased access to relevant survey data, and (5) increased collaboration among interested parties.

Several health care coalitions in North Carolina have set the reduction of ETS exposure as a policy objective. The North Carolina Tobacco Prevention and Control Branch has established long-term (by 2010), short-term (by 2004) and immediate (by 2002) plans and strategies for eliminating exposure to ETS (Tables 3, 4).

Asthma coalitions have surveyed middle school students about asthma and ETS. The NC Department of Public Health's "Start With Your Heart" campaign has canvassed restaurants, promoting "Heart Healthy" dining experiences, which include a smoke-free atmosphere. The Tobacco Prevention and Control Branch has published the comprehensive *Grassroots Guide to Tobacco-Free Schools in North Carolina*. The Branch is working with the University of North Carolina Department of Family Medicine on a comprehensive *ETS Policy Advocacy Tool Box*, and on statewide training of public health advocates about the science of ETS.

Other organizations are using the ADA as part of their overall policy strategy. Currently, SAVE is leading efforts to have Ericsson Stadium in Charlotte change its policy to protect patrons from pervasive ETS exposure at the stadium. SAVE is also working to see that North Carolina's legislative buildings are smoke-free. It is imperative that employees and visitors have a smoke-free legislative building, particularly the 65,000 children who visit the building each year. Those wanting to eliminate ETS exposure in the NC Legislature cite data from the Industrial Hygiene Indoor Air Quality Survey for the North Carolina Legislative Office Building. The survey concluded that "Smoking in the [legislative] building can only serve to degrade the air quality . . . [t]he only way to effectively control the smoke . . . would be to limit smoking to areas under a negative pressure relative to the rest

of the building exhausted directly to the out-of-doors." The report states that this problem will be solved by barring cigarette smoking entirely from the workplace.²⁶

Public health advocates agree that we need more private and public policies to protect the health of North Carolina's citizens. Overturning North Carolina's preemptive clean indoor air law would help; the key to this is increased public awareness of the health hazards of ETS exposure and public demands for protection.

Local coalitions continue to generate support for voluntary policy change, but there is still a great need for a statewide media campaign focusing on the risks of ETS. Survivors of tobacco related illnesses, affected family members, and smoke-sensitive children could effectively communicate the need for smoke-free air and form the core of such a media campaign. Ultimately, combined media and community level policy advocacy to eliminate ETS may optimally protect North Carolina's adults and children.

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Editor's note: Several weeks ago a school teacher sent us the following letter:

My fourth grade surveyed students in grades 3-5 with the question, "Do you live with a smoker?" Over half of the approximately 300 students answered yes. A review of attendance records showed that students who live with smokers miss 29% more school days than those who don't. That's about 2 extra days a year missed by children who breathe second-hand smoke! I suspect, also, that there are correlations with decreased test scores and learning disabilities.

My principal does not want this to go public because she is afraid of angry parent reactions. So I ask that you protect my anonymity. It seems to me, however, that if the word got out a lot of parents might start stepping outside to smoke and not smoke in the car when kids were with them. I'm stuck. What do you suggest?

We forwarded it to Dr. Goldstein, who replied:

As a teacher, you well know the adage, 'Children bring to school what they learn from home.' Thus, it is not surprising (although it is shocking) that tobacco use is not declining much among middle school students in North Carolina when so many parents still smoke. It is even worse to know that parents' tobacco addictions adversely affect the health of many children. Absences from school occur from bronchitis, pneumonia, and asthma exacerbation among children exposed to their parents' secondhand smoke. Your 'suspicion' about test scores may also be correct; research conducted at UNC shows secondhand smoke exposure affects cognitive development in children.

Perhaps the greatest irony and disappointment here is that your principal is afraid to go public because of potentially angry parents. The ones who should be angry here are not those who smoke but the great nonsmoking majority of parents and policy makers across the state. Their anger should be aimed at the fact that some parents make their children inhale a cancer-causing substance. Increasingly, courts are interpreting parents' callous and continuous exposure of their children to secondhand smoke as a form of child abuse.

We clearly need to educate all parents about secondhand smoke and the need to eradicate exposure of their children, spouses, and friends. Children can be a vehicle for that education. I hope your students take multiple messages home to their parents, write letters to local newspapers, write the local Mayor and city council, and even contact the principal about their concerns. As a boy of 10, I got my mother to stop smoking 30 years ago. Perhaps 30 years from now, our students and children will not have to ask their parents to stop an addiction that ultimately kills as many as one out of two smokers and one out of 55 who are exposed to secondhand smoke.

Instructions for Authors

The *North Carolina Medical Journal* is a medium for communication with and by members of the medical community of this state. The *Journal* publishes six times a year: in January, March, May, July, September, and November.

The *Journal* will consider for publication articles relating to and illuminating medical science, practice, and history; editorials and opinion pieces; letters; personal accounts; poetry and whimsical musings; and photographs and drawings. Papers that relate to the present, past, or future practice of the health professions in North Carolina are especially pertinent, but manuscripts reflecting other perspectives or topics are welcomed. Prospective authors should feel free to discuss potential articles with the editors.

Manuscript Preparation

Prepare papers according to the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" (N Engl J Med 1991;324:424-8) with the following exceptions: 1) no abstract is needed; 2) no running title is needed; and 3) report measurements in metric units; use of the International System of Units (SI) is optional.

Submit a cover letter and a 3 1/2-inch computer disk that contains the text written in MS DOS- or Macintosh-compatible format. *Also enclose three hard copies of the text for review purposes.* Double space text with one-inch margins. *Please do not "format" the text* (e.g. no variations in type size, no bold face, no italics, no embedded endnotes).

Submit photographic illustrations, in duplicate, as high-quality color 35mm slides or 5-by-7 or 8-by-10-inch glossy prints, or as black-and-white glossy prints (5-by-7 or 8-by-10-inch). Label all illustrations with author's name, number them sequentially according to their position in the text, and indicate the orientation of the images, if necessary. *Do not write directly on the backs of prints.* This can damage them. If figures require printing in four-color process, we may ask the author to pay printing fees or a portion thereof.

Submit tables, charts, and graphs as hard copy *and* include copies on disk, in their original format *and translated as TIFF, PICT, or EPS documents.* Type all figure legends separately. Type and double-space all tables, one to a single sheet of paper. Tables must have titles and consecutive Arabic numbers.

Keep references to a minimum (preferably no more than

15), retaining those that document important points. The "Uniform Requirements" cited above contain reference format. We customarily list the first three authors for "et al"-type references. Authors are responsible for the accuracy and pertinence of all citations.

Avoid abbreviations entirely if possible; keep them to a minimum if not. When used, completely define abbreviations at the first point of usage in the text.

Manuscript Review and Editing

A medically qualified editor reads all manuscripts and, in most instances, sends them out for further review by one or more other members of the North Carolina Medical Society. *Authors' cover letters must include a line that states that their submitted manuscripts are not under consideration for publication elsewhere. It is not the Journal's policy to reprint previously published articles.* Decisions to publish or not are made by the editors, advised by the peer reviewers.

We encourage a relatively informal writing style since we believe this improves communication. Imagine yourself talking with your unseen audience—as long as this doesn't lead you to scientific or linguistic inaccuracy. Be brief, clear, simple, and precise.

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Important Information from Your Doctor About
.....

PROSTATE CANCER

What is Prostate Cancer?

- Prostate cancer is the most common cancer in American men.
- The prostate is a walnut-sized gland at the base of the penis.

What causes Prostate Cancer?

The cause is unknown, but we do know that some men are more likely to develop prostate cancer:

- Men over the age of 50
- Men with a family history—a father, brother or son who has been diagnosed with prostate cancer
- Black men

What can you do to protect yourself from Prostate Cancer?

We do not know of any way to prevent prostate cancer at this time, but there are two tests that are done together to detect the disease:

- ***Digital Rectal Exam (DRE)***
- ***Prostate Specific Antigen (PSA)***

The **DRE** is a physical exam done by your doctor. The **PSA** is a blood test. These are called screening tests, because a positive test *may* mean that cancer is present in the prostate, but does not prove it. The only way to be sure is for the doctor to test tissue from the prostate.

What questions should you ask?

- **Who should be tested?**

Every man should discuss the screening tests with a doctor. Any man with a family history of prostate cancer and all black men should discuss prostate cancer testing with a doctor starting at age 40. Other men should discuss prostate cancer testing with a doctor starting at age 50.

- **But, do I need to be tested?**

Talk with your doctor. Men at a certain age (usually 70 years of age and older), may not need to be tested, but only you and your doctor can decide what is right for you.

- **Can I do anything to prevent prostate cancer?**

Right now, we do not know what can help reduce the chance of developing prostate cancer—eating less fat *may* help, but this is not proven.

Different medicines and dietary supplements are being studied to see if they can prevent prostate cancer. Talk to your doctor about clinical trials that you may qualify to join, or call **1-800-4-CANCER** for more information.

Remember to ask your doctor! If you have any other questions about prostate cancer or cancer in general call:

**The Cancer Information Service
1-800-4-CANCER**

OR

**American Cancer Society
1-800- ACS-2345**

Important Information from Your Doctor About

BREAST CANCER

What is Breast Cancer?

Breast cancer is cancer of the breast. It is the most common cancer diagnosed in women.

What causes Breast Cancer?

Any woman is at risk for developing breast cancer. Some characteristics put women at greater chance of developing it:

- having a mother, sister or daughter who has had breast cancer
- being over age 30 when your first child was born
- being over age 60

What can you do to protect yourself from Breast Cancer?

Prevention: A medicine called Tamoxifen was found to reduce a woman's risk in half if she was at high risk for developing breast cancer. A new study, STAR, is looking at Tamoxifen and Raloxifene in the prevention of breast cancer.

Early Detection: There are three things women can do to detect breast cancer earlier, when it is more curable:

- 1) starting at age 18, practice regular breast self examination every month;
- 2) get an annual examination of your breasts by a health care professional beginning at age 20; and
- 3) get a mammogram every 1 to 2 years beginning at age 40 and every year from age 50 and older

What questions should you ask?

Talk with your doctor about prevention and early detection exams that are right for you. If you have questions about prevention, early detection, or treatment options call the National Cancer Institute at 1-800-4CANCER or the American Cancer Society at 1-800-ACS-2345.

Important Information from Your Doctor About

CERVICAL CANCER AND THE PAP TEST

What is Cervical Cancer?

Cervical cancer is cancer of the uterine cervix. Cervical cancer is the third most common cancer in women.

What causes Cervical Cancer?

A risk factor is anything that increases a person's chance of getting a disease. The **National Cancer Institute** lists the following risk factors for developing cervical cancer:

- Beginning sexual activity at an early age (Before age 16)
- Multiple sexual partners
- Smoking
- A lack of regular Pap test/screening history
- HIV infection
- Diet
- HPV (Human papilloma virus) infection

The **American Cancer Society** includes the following additional risk factors:

- Age – The risk increases between the late teens and mid thirties. The average age of women with newly diagnosed cancer is between 50 and 55.
- Race and ethnicity – African Americans, Hispanics and American Indians have cervical cancer death rates that higher than the U.S. average.
- Low socioeconomic status
- Diethylstilbestrol (DES) exposure

What can you do to protect yourself from Cervical Cancer?

Cervical cancer can be prevented with regular Pap tests and prompt follow-up of any problems found.

The pap test, a screening test for cervical cancer and its precursor lesions, was introduced more than 50 years ago by Dr. George Papanicolaou. Since its introduction, the Pap test has significantly reduced deaths caused by cervical cancer. The Pap test is a cellular sample removed from the lower female genital tract. The cell sample is sent to the laboratory where it is processed and examined under a microscope for cell changes that suggest cancer or pre-cancer.

It is recommended that all women who have had sexual intercourse or age 18 should have a Pap test. After three consecutive negative annual Pap tests, the medical care provider may recommend regular Pap tests of one-to-three year intervals.

What questions should you ask?

Are there any instructions for the PAP test?

The likelihood of getting a better quality test is increased if nothing is inserted into the vagina for 48-72 hours before the Pap test.

- No douching
- No intercourse
- No tampons
- No vaginal medication or lubricants
- No vaginal contraceptive

Important Information from Your Doctor About

.....

CANCER CLINICAL
TRIALS

What is a Cancer Clinical Trial?

Doctors are trying to find better ways to identify cancer in its very early stages and better ways to treat cancer. They are also trying to find ways to prevent cancer.

The best method to find new and better ways to prevent cancer, identify it early for better treatment, and treat cancer is through clinical research studies, or clinical trials.

Why do cancer patients take part in research studies, or clinical trials?

Cancer patients join clinical trials for many reasons. Some reasons are:

- My doctor suggested that I take part in this study.
- I wanted to do all I can to try to beat my cancer.
- Taking part in this study will allow me to get the best possible care for my cancer.
- If I can help others with cancer, I'm glad to help.
- I want to help find a cure for cancer.

Why are research studies or Clinical Trials needed?

Studies are needed to compare new medicines to medicines being used now to see which is better. Clinical trials also allow doctors to collect important information about patients to identify which patients respond to medications.

What should you know about Cancer Clinical Trials?

Your doctor thinks that research studies are important.

Your care will be at least as good as you would normally receive.

Some studies use computers to decide whether you receive the established treatment or a new one. Both medicines are considered good. It is important to have equal numbers of people in both groups.

You do not have to join a study. Your doctor will treat your cancer as best possible even if you are not in a clinical trial.

Many treatment studies are for people with curable cancer—a clinical trial is **not** a “last hope” treatment.

If you consider joining a clinical trial, what questions should you ask your doctor?

- Is there a study that would be right for me to join?
- What is the main purpose of the study?
- What will be done in the study and how will it be done?
- What will the clinical trial demand of me in time and money?
- How could the study affect my daily life and routine?
- What side effects could I expect from the study?
- How does the new medicine compare to the old one used now?
- How long will the study last?

Be sure to ask your doctor as many questions as you want before you decide. Talk to your family and friends, too. **FOR MORE INFORMATION CALL 1-800-CANCER**



'What Do They Know About It?'

How the North Carolina Public Views Cancer Clinical Trials: Implications for Primary Care Doctors

Betsy Randall-David RN, PhD, Nancy Stark, RN, PhD, Jennifer Gierisch MPH, and Frank Torti, MD

Cancer is the second leading cause of death in the nation and in North Carolina.^{1,2} Clinical trials are the primary way in which we advance our understanding about cancer prevention, detection, and treatment. Despite the large number of clinical trials available, few (<3% of eligible adult cancer patients) in the United States participate in one;³ even fewer join prevention trials.⁴ Patient perspectives on clinical trials significantly influence the decision to participate or not.^{5,6}

The North Carolina Advisory Committee on Cancer Coordination and Control (NCACCCC), recognizing the importance of public awareness of cancer clinical trials, set the objective of launching "a state-wide educational campaign focusing on the value of clinical trials in cancer prevention, early detection, and treatment."⁷ In 1999–2000, the NCACCCC, the National Cancer Institute (NCI), and the Cancer Information Service jointly sponsored a state-wide campaign to increase public awareness of clinical trials ("*Cancer Trials...because LIVES depend on it*").

In preparation for the campaign, the NCACCCC's Care Subcommittee convened a series of focus groups to obtain North Carolinians' views on medical research and cancer clinical trials. This article describes the focus group findings that informed the campaign, discusses the implications of the findings for primary care doctors, and briefly describes the training of educational ambassadors.

Scope of the Problem

Several studies examining recruitment of subjects into clinical trials have identified personal and cultural barriers to participation. There are a number of barriers, particularly among minority populations.^{3,5,6,9-11} They include (1) the

perception of being a "guinea pig"; (2) fear of receiving unproven treatments; (3) lack of education, which impedes understanding or communication about clinical trials; (4) rural residence, which limits access to health care; (5) previous negative experience by family or friends; and (6) distrust of medical and government research and researchers. It is clear that any campaigns to increase participation in clinical trials must identify misconceptions about such trials, and address barriers arising from a lack of education or knowledge. We used focus groups to elicit perceptions of urban and rural North Carolinians about participation in clinical trials.

Methods

Thirty-seven participants were recruited in four focus groups (from one urban and three rural locations). Eligible participants had no previous cancer diagnosis (except for non-melanoma skin cancer) and no prior participation in cancer clinical trials. One participant had participated in a non-cancer trial, and three had had skin cancer. Demographic characteristics (Table 1) show that participants were predominantly middle-aged white women with at least a high school education. Focus groups lasted approximately 90 minutes and were led by one of the authors (BRD). Each group was tape recorded (for later transcription by MedScribe services), and written notes were kept. Participants were questioned about their experience with and exposure to clinical trials (Table 2). Each group was asked to respond to questions and statements designed to elicit participants' knowledge of, opinion about, and sources of information about cancer clinical trials. The note-taker identified the group responses in contrast to those of one individual.

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Table 1. Demographic characteristics of 37 focus group participants

Number of focus groups	4	Race/ethnicity	
Number of participants		White	21 (58%)
Durham (urban)	10 (27%)	Black	11 (31%)
Wendell (rural)	11 (30%)	Hispanic/Latino	1 (3%)
Roxboro (rural)	10 (27%)	Native American	2 (6%)
Moncure (rural)	6 (16%)	Other	1 (3%)
Age (in years)		Highest year of education	
mean	55	< High school	2 (6%)
range	18-72	High school	12 (39%)
Gender		Some college	6 (18%)
men	8 (22%)	College grad	5 (15%)
women	29 (78%)	Post-college	7 (21%)

Table 2. Responses of 37 participants in cancer clinical trials focus groups, 1999

Ever diagnosed with cancer?		Know anyone who participated in a clinical trial?	
yes	3 (8%)	yes	11 (30%)
no	34 (92%)	If yes, who?	
Know anyone who has had cancer?		family member	3 (30%)
yes	35 (95%)	friend/neighbor	5 (50%)
If yes, who? (Check all that apply.)		other person	3 (30%)
family member	25 (76%)	If yes, was it a cancer clinical trial?	
friend/neighbor	14 (42%)	yes	1 (9%)
other person	5 (15%)	no	7 (64%)
Ever heard the term clinical trial?		don't know	3 (27%)
yes	20 (57%)	Have you ever received information about cancer clinical trials?	
Ever been offered the chance to participate in clinical trials?		yes	5 (14%)
yes	5 (14%)		
If yes, did you participate?			
yes	1 (20%)		

Focus Group Results

Responses to questions were generally classified as to (1) sources of health information, (2) perception of clinical trials and medical research, and (3) suggested spokespersons for clinical trials awareness campaigns.

Sources of Health Information. Respondents identified a variety of sources of information about general health issues and treatment, and cancer-related information and treatment: the Internet, medical books in personal or outside libraries, television, and newspapers and magazines. When asked about the best sources of medical information about treatment, respondents cited family doctors, family, and friends who work in health care, the Internet and teaching hospitals (library or doctors).

The preferred sources of clinical trial information were the personal physician, Internet searches, and advertisements in newspapers and magazines. Many felt that although local doctors (especially rural doctors), might not have information about clinical trials, they would know where to refer patients for more information or for treatment by specialists who were aware of clinical trials. Very few respondents knew about the 1-800-4-CANCER information line.

Perceptions of Clinical Trials and Medical Research. Participants had an overwhelmingly negative response to the term "medical research," associating it with phrases like "guinea pig," "experimentation on animals and humans," and "placebo." There was much misunderstanding about clinical trials (most respondents believed that a two-arm trial tests a drug against placebo). There was little awareness of clinical

trials of preventive or early cancer detection methods. When asked about medical researchers' participation in clinical trials, many respondents suspected that physicians encouraged patients to enroll in clinical trials for financial or professional gain. A number of participants said that doctors had more allegiance to the pharmaceutical industry than to the best interest of their patients.

Despite general agreement among participants that medical research led to important advances in disease prevention, detection, and treatment, few said that they would consider clinical trial participation unless they were desperate, and had no hope of cure from standard treatment. Reasons for their unwillingness to enroll included travel distance, lack of time, fear of getting a placebo rather than a drug, religious beliefs, fear of becoming sicker from "experimentation" than from the disease itself, and the belief that certain interventions would actually spread cancer. Cancer prevention trials were more acceptable to participants than treatment or detection trials.

When asked why anyone would participate in a cancer clinical trial, participants suggested motivation by altruism (a desire to help others in the family or their community), reimbursement (being paid to participate), and the belief that a clinical trial offered the only hope for cure (so there was nothing left to lose). Respondents felt that persons most likely to consider participating in a clinical trial would be young, curious, open-minded, educated, and have few responsibilities for the care of other family members (children, sick spouses, or elderly parents). Conversely, they felt those unlikely to participate would be deeply religious, fearful, ignorant, or burdened by responsibilities for others.

Focus groups responded negatively to the statement, "Clinical trials are the gold standard of medical care today. Every patient gets either the best new treatment or the most promising treatment not yet available elsewhere." Participants believed the statement to be false, citing slow recruitment to clinical trials as evidence. In contrast, their reactions to the statement, "Clinical trials *can* offer state-of-the-art medicine to all kinds of people, not just those who can afford it," were positive. The word "can" appeared to add a sense of honesty and realism, as though no one were trying to fool them into thinking that trials were the only treatment option.

Suggestions for a Clinical Trials Awareness Campaign.

All focus groups said that the most credible spokesperson for a clinical trials public education campaign would be a trusted community member who was a known cancer survivor, and who had had a successful or positive experience with clinical

trials. Participants favored this type of spokesperson over a celebrity or an unknown doctor. A second choice was a well-respected community doctor who had personal experience (say, a family member with successful clinical trials experience). A celebrity who had been treated for cancer and had a positive experience with clinical trials would be credible, but less effective.

The focus group findings were helpful in designing a cancer clinical trials awareness campaign. Participants felt that we should publicize the 1-800-4-CANCER number. They also felt that the Internet would be an effective way of educating the public about clinical trials, and they thought it would be useful to cross-list information about clinical trials on multiple websites. The Internet could greatly increase public access to cancer clinical trials information.

"Many felt that although local doctors (especially rural doctors), might not have information about clinical trials, they would know where to refer patients for more information or for treatment by specialists who were aware of clinical trials."

A key finding from our survey was the perception that personal testimony from those with positive experiences in cancer clinical trials, particularly someone known and respected by members of the community, would greatly influence how others felt about medical research and clinical trials. Participants recommended that personal testimony be combined with statistics and information about the scientific and medical advances that resulted from such clinical trials. This would enlighten people and make them more receptive to joining clinical trials. Finally, they recommended that awareness campaigns appeal to people's altruism by emphasizing the personal and societal benefits of clinical trial participation.

The focus groups provided the kind of information needed to design a campaign to educate communities about cancer clinical trials. The findings are strikingly similar to

those of previous studies of minority recruitment to clinical trials.^{9,11-14} These include lack of knowledge and understanding about clinical trials, fears of being a "guinea pig," and suspicion of the medical community, particularly researchers. The notion that well known and respected community leaders are preferred spokespeople and can improve the reputation of research studies within communities has been reported elsewhere.¹³ Finally, many viewed clinical trials as a "last hope" for a cancer patient's survival, thus implying that anyone taking part had little chance for survival.

We especially noted the inconsistency about sources of information and attitudes toward medical research and researchers. When queried about medical research, participants expressed distrust of the medical community in general (saying that doctors recruit to trials for personal gain), but the family doctor was identified as a primary source for information about clinical trials. Thus, the findings are particularly relevant for the community primary care doctors.

Focus Group Findings: Implications for Providers

Community interest in clinical trials is largely focused on hearing from those who have experience with cancer—either personally or through a family member or close friend. However, respondents considered the primary care doctor to be the chief source of information about clinical trials, and consequently this position is a key, trusted resource for medical information. Even the suspicion with which respondents viewed medical research and medical researchers in general suggests that the family doctor commands a special place of trust and respect, a first-line resource for patients concerned about clinical trials and cancer. Primary care providers are in a position to provide accurate information that the patient will accept. Educational materials (see the information for patients in this issue of the *Journal*) can be placed in waiting rooms, or given to newly diagnosed patients to provide information that initiate a discussion about clinical trials.

The Cancer Clinical Trials Awareness Campaign

In November 1999 the NCACCCC, in partnership with the National Cancer Institute, launched a campaign entitled *Cancer Trials...because LIVES depend on it*. Using information obtained from the focus groups, the Clinical Trials Awareness Campaign planners designed a series of sessions to train clinical trials “ambassadors,” lay and professional people interested in educating their communities about cancer clinical trials. Volunteer participants attended a one-day, seven-hour training session designed to provide them with an understanding of the following: (1) how clinical trials operate; (2) barriers to and promoters of participation in cancer clinical trials; (3) the roles and responsibilities of “ambassadors”; (4) practice in how to use educational materials provided; and (5) development of an action plan for work in their communities.

The training program was designed by NCI staff and consultants to be highly interactive and was based on principles of adult learning. There was a participant training manual, a video, brochures and other informational sheets to be used in community presentations, and a resource manual with additional information and references. Participants were taught how to use the Physician’s Data Query (PDQ) to locate clinical trials for specific types of cancer. They were encouraged to use the 1-800-4-CANCER (Cancer Information Services) number for their own use and to give it to others who wanted more information.

More than 225 participants attended one of 12 sessions, all but one of which, because of logistical and other constraints, took place in rural and urban areas of the state’s 50

western counties. Training sessions included both lay and professional community participants. Since clinical trials research was not a high priority in the community, recruitment of volunteers for the training required the efforts of a full-time outreach specialist. The original plan to recruit from voluntary health organizations, particularly those with a mission of cancer education and treatment, was only moderately successful. It proved more fruitful to use cancer support groups, other community-based organizations, and local hospitals to identify potential participants.

Summary and Recommendations

No one disputes the public’s need for accurate information about cancer clinical trials. Many people, even some health professionals, have a negative view of the importance of clinical trials in translating research to clinical practice. In this paper we have described a cancer clinical trials awareness campaign launched by the NCACCCC and NCI. Based on information derived from community focus groups about community perceptions of clinical trials research, the campaign trained community “ambassadors” to educate their communities about cancer clinical trials. Participants who attended the training sessions rated them highly, but participation was limited. If others want to replicate the model, they should budget the time and effort needed to recruit participants.

Findings from our focus groups, and the outcome of recruiting and training, confirm the need for innovative cost- and time-effective outreach strategies to encourage greater participation in this experience. Close collaboration of cancer treatment center staff with health professionals involved in cancer education, screening, detection, treatment, and research may yield better participation. Our findings highlight the special role of primary care providers (and specialists who diagnose and treat cancer patients) in providing educational materials and information to their patients. They can help correct misconceptions about clinical trials. In the meantime, the materials we used in our campaign are available through NCI by calling 1-877-74-LIVES.

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Speaking of Medicine

CANCER

It is better not to apply any treatment in cases of occult cancer; for, if treated, the patients die quickly; but if not treated, they hold out for a long time.

—Hippocrates, 460-375 BC

When the tumor extends its feet from all sides of its body into the veins, the sickness produces the picture of a crab.

—Galen, 130-200

The Ancients said that when a cancer is in a site where total eradication is possible, such as a cancer of the breasts or of the thigh, and in similar parts where complete removal is possible, and especially when in the early stage and small, then surgery was to be tried. But when it is of long standing and large you should leave it alone. For I myself have never been able to cure any such, nor have I seen anyone else succeed before me.

—Albucasis (*Abul Qasim*), circa 1050

A cancer is not only a physical disease, it is a state of mind.

—Michael Baden, 1979

While there are several chronic diseases more destructive to life than cancer, none is more feared.

—Charles H. Mayo, William Hendricks, 1926

The older a cancer is, the worse it is. And the more it is involved with muscles, veins and nutrifying arteries, the worse it is, and the more difficult to treat. For in such places incisions, cauteries and sharp medications are to be feared.

—Theodoric, *Bishop of Cervia*, 1267

In the community of living tissues, the uncontrolled mob of misfits that is cancer behaves like a gang of perpetually wilding adolescents. They are the juvenile delinquents of cellular society.

—Sherwin B. Nuland, 1994

The enemy is not pain or even death, which will come for us in any eventuality. The enemy is cancer, and we want it defeated and destroyed.

—George Zimmer, 1997



Prostate Cancer as a Public Health Issue in North Carolina

Nancy Stark, RN, PhD, Electra Paskett, PhD, Wendy Demark-Wahnefried, PhD, Elena Carbone, DrPH, RD, and Paul Godley, MD

Prostate cancer is a significant health problem for men in North Carolina, particularly for black men, who have one of the highest rates of prostate cancer mortality in the nation. Despite the magnitude of the problem, the value of prostate cancer screening is hotly contested among medical researchers, clinicians, and patient advocates. The Early Detection Subcommittee of the North Carolina Advisory Committee on Cancer Coordination and Control (NCACCCC) identified prostate cancer as one of four cancers for which early detection was a key issue, and set forth two goals: (1) develop a consensus regarding the public health message about prostate cancer screening, including the benefits and risks of early detection; and (2) develop research priorities for prostate cancer issues in North Carolina. Reaching these goals will require a clear understanding of the epidemiology of prostate cancer in the state, as well as the implications of screening and treatment for the disease. In this paper we do the following: (1) review prostate cancer epidemiology in North Carolina; (2) discuss the key controversial points related to screening; (3) briefly review prostate cancer research in the state; and (4) present the Advisory Committee's current recommendations on screening for prostate cancer.

Prostate Cancer in North Carolina

From 1991 to 1995, the age-adjusted incidence of prostate cancer in North Carolina was 133/100,000 and mortality was 31/100,000; the incidence rate was 123/100,000 among white men in contrast to a rate of 180/100,000 among black men.¹

Black men in North Carolina have one of the highest mortality rates of prostate cancer in the nation.² They have a slightly higher rate of regional spread at diagnosis (22% vs. 20% among white men), but over twice as many black men have distant metastases at diagnosis compared to white men (17% versus 7%). One potential explanation for this disparity relates to health-seeking behaviors regarding prostate cancer screening and treatment.

Data from the North Carolina Central Cancer Registry reveal that prostate cancer incidence rates for both blacks and whites increased between 1990 and 1995. There was a shift to diagnosis at earlier stages during this time, but blacks continued to present with significantly more regionally and distantly spread disease.

In 1980, 24 of every 100,000 white men died of prostate cancer, but this had decreased to 20/100,000 by 1997. In contrast, 56 of every 100,000 white men died of prostate cancer in 1980, but this had risen to 59/100,000 in 1997. The death rate for black and white men combined fell between 1980 and 1997 from 29/100,000 to 25/100,000 (despite the increased mortality rate for white men). Some observers have attributed the drop in mortality to the increased use of PSA screening, but others have noted that the drop in national prostate cancer mortality occurred too quickly to be caused by earlier detection of a relatively slowly progressive disease.⁴

Prostate Cancer Screening in North Carolina. The 1998 Behavioral Risk Factor Surveillance survey found that 40% of North Carolina men aged 40 and older reported having discussed prostate cancer with their doctor in the preceding year (see Table), and the percentage was greater for

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Table 1. Prostate cancer screening among North Carolina men aged 40 years or more

	n	Doctor discussed screening in past year ² (%)	Ever had digital exam (%)	Had digital rectal exam within past year (%)	Ever had prostate specific antigen test (%)	Had prostate specific antigen test within past year
Overall	567	40.2±5.2	68.8±5.3	41.9±5.1	45.8±5.7	30.8±4.7
Age						
40-49	190	23.9±6.9	58.7±8.7	28.8±7.6	25.5±8.1	18.6±6.6
50-64	193	41.8±9.6	68.9±10.0	43.6±9.1	47.6±10.2	33.2±8.8
65+	184	61.0±9.0	82.8±8.3	59.0±9.0	71.8±8.2	45.3±8.8
Race						
White	449	42.0±5.8	69.9±6.0	43.2±5.7	48.2±6.4	32.8±5.4
Black	100	35.6±11.8	66.7±12.0	40.7±12.3	38.6±13.4	24.2±10.8
Residence ³						
Urban	201	39.8±7.8	74.8±7.8	44.0±7.9	47.0±8.7	26.2±6.5
Rural	366	40.5±6.9	64.9±7.1	40.6±6.7	45.1±7.5	33.8±6.5
Household Income (\$/yr)						
< 15,000	74	28.2±13.9	61.3±20.1	33.1±14.3	40.9±18.3	26.0±12.7
15,000-24,999	106	38.3±11.2	59.2±12.0	39.2±11.5	34.3±11.6	25.5±10.3
25,000-49,999	179	42.4±8.5	72.3±8.0	45.9±8.5	44.8±8.8	33.7±8.0
50,000+	125	38.3±11.2	77.0±8.8	43.7±11.3	48.2±12.6	34.1±10.5
Education Level						
Less than HS	134	35.8±10.2	57.9±12.0	34.9±9.9	41.3±11.9	
Grad HS Grad/GED	163	37.2±9.9	63.2±10.8	40.2±9.6	40.7±11.0	28.0±9.2
Some College/Tech. School	128	39.9±9.9	78.9±7.8	45.0±10.0	48.5±10.4	33.0±9.2
College Graduate	140	47.4±10.9	75.5±8.8	47.0±10.5	53.4±11.7	39.9±10.2

·CI = 95% for all data

¹Data have been weighted to reflect the age and race distribution of adult men in North Carolina.

²Doctor or other health professional talked with respondent within past 12 months about having any kind of screening test or exam to check for prostate cancer.

³Urban residence was defined as residence in a county whose population was at least 50% urban according to the 1990 census.

Source: 1998 Behavioral Risk Factor Surveillance System, Division of Community Health, NC DHHS, (919) 733-7081, 5/99.

whites (42%) than for blacks (36%). The likelihood of a doctor-patient dialogue about prostate cancer was significantly greater among men with more education and those with higher incomes.

Overall, 42% of men reported having had a digital rectal examination (DRE) in the preceding year (43% of white men and 41% of black men). Men with higher incomes and more education were more likely to report having had a recent DRE, and were more likely to have ever had a DRE. Approximately 31% of men surveyed reported having had a Prostate Specific Antigen (PSA) level measured in the past 12 months. Nearly 33% of white men reported having been tested, in contrast to 24% of black men; again, those with

higher incomes and more education were more likely to have been tested. These findings are consistent with data reported by Demark-Wahnefried et al³ who found that medical center screenings for prostate cancer attracted predominantly (84-89%) white married men, many of whom had undergone a prior prostate cancer screening.

To Screen or Not to Screen: The Controversy

To be effective, population-based screening for any disease must meet five criteria: (1) the disease must be an important health problem; (2) the screening program must identify the

disease in a localized, asymptomatic phase; (3) the screening tests should have adequate sensitivity, specificity, and predictability; (4) the possibility of curing early-stage disease must be significantly greater than of curing late-stage disease; and (5) the screening test must lead to improved outcomes (for example, that those screened live longer than those not screened). The controversy surrounding prostate cancer screening hinges on the extent to which current tests and treatments meet these criteria.

Two widespread prostate cancer screening tests are the DRE and the PSA blood test.⁵ In general, the DRE is less sensitive than the PSA, but the PSA itself has been criticized for lack of sensitivity and specificity.⁶ The PSA test sensitivity is 79% (meaning that the test will *fail* to detect cancer in 21% of men tested), and specificity is approximately 59% (meaning that in 41% of men with an elevated PSA value, prostate cancer is *not* present).⁷ It may be possible to improve specificity,⁶ but this is not yet proven. There are at least two schools of thought about the appropriateness of routine screening for prostate cancer and whether to pursue aggressive treatment when the disease is diagnosed.

The Case for Routine PSA Screening. The American Urological Association, the American College of Radiology, and—until recently—the American Cancer Society have endorsed screening for prostate cancer on the assumption that improved detection methods can identify prostate cancer in its early stages when it is still confined and can be more easily treated and, possibly, cured. The idea is that, in men who are not screened, the disease will be detected only when it is advanced and therefore incurable.⁶ Early detection through routine screening, the argument goes, may well mean the difference between life and death.⁷ These groups both recommend an annual DRE and a PSA test for men starting at age 50.

The Case Against Routine PSA Screening. Several professional groups—the US Preventative Services Task Force, the American Academy of Family Physicians, the American College of Physicians, and the National Cancer Institute—either recommend against or take no stand regarding routine PSA screening. Opponents of population-based prostate cancer screening cite several concerns. First is the lack of scientific evidence proving that PSA screening reduces disease-specific mortality.^{8,9} Trials to test this hypothesis are currently under way, but results will not be available for several years. Second, although the PSA test is the best way currently available to detect prostate cancer in its early stages, it lacks adequate specificity or sensitivity.¹⁰ Third, evidence suggests that not all cases of prostate cancer are life-threatening and some may not require treatment at all.¹⁰ The implication of the latter point is that routine screening would reveal cancers that, if they remained undetected, would never result in illness or death.¹¹ Indeed, the side

effects from treating these indolent cancers may outweigh the purported benefits of treatment.

Experts on both sides of the screening issue agree that screening should be avoided in men who are over 70 years of age or who have a life expectancy of less than 10 years because the disease is unlikely to shorten life expectancy in this population.¹² Opponents argue further, that PSA screening is not cost-effective and can lead to a reduced quality of life^{6,11} because both prostatectomy and radiation treatment can cause urinary incontinence and impotence.

It is likely that prostate cancers vary in aggressiveness, but to date there are no screening tests that can differentiate aggressive from non-aggressive cancers. Therefore, while it may be premature to recommend routine screening of *all* men, routine screening of targeted, high risk populations like black men and those with a family history of prostate cancer may be appropriate.^{11,13} Nevertheless, just as there are no results from controlled trials of generalized PSA screening, no empirical data support the strategy of screening high-risk individuals. In the past year, the American Cancer Society revised its earlier recommendation about general screening, and now urges men 50 and older (40 and older for black men) to consult their physician about the need for prostate cancer screening.

Prostate Cancer Research in North Carolina

A Research Roundtable convened by the Early Detection Subcommittee in May 1997 reviewed present knowledge about prostate cancer screening and treatment, the epidemiology of prostate cancer in North Carolina, and prostate cancer research currently under way in the state. Based on its review, the Roundtable identified two priorities: (1) further research using databases to collect and assess prostate cancer screening, diagnosis, and outcome, and (2) communication with and education of the lay and medical public about prostate cancer risk.

Database Assessment and Development. Database research has focused largely on explaining the racial differential of prostate cancer in North Carolina. Investigators have attempted to identify factors that might explain why black men experience higher incidence rates of prostate cancer; present with later-stage, more aggressive disease; and have higher mortality rates. Additional research has focused on reaching high-risk men for both prevention and treatment.

Several studies have explored reasons for racial differences in prostate cancer incidence and mortality. Paskett et al¹⁴ reviewed hospital-based tumor registries in 13 North Carolina hospitals, focusing on differences in treatment of black and white men. Black men were more likely to be diagnosed at later stages than white men, to be older at the time of diagnosis, and to be symptomatic. Furthermore,

black men got more conservative treatment ("watchful waiting") whereas Caucasian men were more likely to be treated with radical prostatectomy. Differential treatment patterns were evident even after the data were adjusted for stage at diagnosis. This study highlighted the need for community efforts to get black men into the health care system before they become symptomatic, and to assure proper and timely treatment in order to reduce prostate cancer mortality.

The data of Paskett et al contrast to those of Demark-Wahnefried et al,¹⁵ who conducted telephone interviews with 231 men who were diagnosed with prostate cancer, evenly stratified with regard to localized and metastatic disease. The 117 white and 114 black participants were questioned about the various treatment options they had discussed with their doctors. This study found that the doctor was the primary factor influencing the patient's treatment decision, and that black and white men received comparable treatment. The investigators concluded that screening, behavioral, and genetic factors—rather than differences in treatment—tended to explain racial differences in mortality. This study recruited participants statewide while Paskett et al used data from men diagnosed with prostate cancer in 13 hospitals. The differences in conclusions may be a result of selection bias in the Demark-Wahnefried et al study, or there might have been missing treatment information in the registries from which Paskett et al obtained information.

Aldrich et al¹ reviewed the North Carolina Central Cancer Registry database, focusing on the increased prostate cancer incidence and mortality rate among black men. They confirmed that advanced stage at diagnosis was associated with higher mortality, and that hospital size was related to stage at diagnosis. Smaller facilities reported a greater proportion of early-stage cancers; 24% of prostate cancers in North Carolina were diagnosed in hospitals with fewer than 150 beds as compared to the national average of 5.2%.

An examination by Conlisk et al¹⁶ of demographic and behavioral factors related to stage at diagnosis of prostate cancer demonstrated inverse associations between cancer stage and personal income, and between cancer stage and health insurance status in black men but not in white men. There were similar inverse associations between prostate cancer awareness, PSA screening, and stage at diagnosis among black men but not among white men. Knowledge of prostate cancer risk factors was not significantly associated with stage at diagnosis for either race, and less than one third of men—again, of either race—knew that black men were at increased risk for dying of prostate cancer.

In a survey study of over 1700 men attending prostate

cancer screening campaigns throughout North Carolina, Demark-Wahnefried et al³ found that mass screening programs primarily attracted white men who already were receiving regular cancer screening. These results underscore the need to improve screening opportunities for underserved populations.

Attempts to explain the striking differences in prostate cancer epidemiology between black and white men has led to research into prostate cancer etiology and risk factors. In a case control study, Bostick et al¹⁷ examined the association between biomarkers and diet and other prostate cancer risk factors, searching for potential causes to explain racial discrepancies in prostate cancer incidence. Three biomarkers—cadmium exposure (measured as urine excretion of cadmium), markers of oxidative damage to cells (measured as DNA base damage), and drug metabolism genes (phenotypes and genotypes)—were studied in 112 cases and 258 race-matched controls. Preliminary analysis suggests that farm work, dietary factors (specifically, increased calorie intake and the consumption of red meat and well-cooked meat), and the NAT1*10 genotype are associated with increased risk for prostate cancer. Several other epidemiologic studies are currently under way in North Carolina to explore other gene-environment interactions and their potential contribution to this disease.

Risk Communication and Education.

Educating high-risk men about prostate cancer is central to improving screening practices. Paskett has proposed an education intervention for black men at high risk

that will do the following: (1) describe prostate cancer and its symptoms, (2) explain "risk," (3) discuss options for screening and the interpretation of abnormal values, and (4) describe diagnostic and treatment options. If successful as a pilot study, this proposal will lead to a large-scale education program that will determine the effect of improved knowledge, attitudes and screening practices on prostate cancer mortality and morbidity in black men.

Current Recommendation for Prostate Cancer Screening

The Early Detection Subcommittee's review of prostate cancer epidemiology, the screening controversy, and prostate cancer treatment side effects made it difficult to arrive at a consensus recommendation on prostate cancer screening. The high prostate cancer mortality among African-American men in North Carolina and the lack of randomized

"Investigators have attempted to identify factors that might explain why black men experience higher incidence rates of prostate cancer; present with later-stage, more aggressive disease; and have higher mortality rates."

clinical trials clearly demonstrating the efficacy of screening fueled a debate among committee members on the appropriate language for communication to the public. The following recommendation was accepted by the NCACCC on April 28, 2000:

"All men should be made aware of the current state of knowledge on prostate cancer screening, and, starting at age 50, men should speak with their physician about whether prostate-specific antigen (PSA) screening and/or digital rectal examination (DRE) is appropriate for them. Men in high-risk groups such as African-Americans or those with a strong familial predisposition (i.e., one or more affected first-degree relatives), should discuss screening with their physician at a younger age (i.e. 40 years). It is possible that PSA screening of asymptomatic men detects prostate cancers at an earlier stage than prostate cancers diagnosed after symptoms occur. However, currently there is insufficient scientific evidence that periodic screening with PSA and/or DRE reduces prostate cancer mortality. Therefore at this time, the Advisory Committee supports collaborative physician-patient informed decision making rather than a general recommendation.

"The Advisory Committee recommends that all scientific data related to prostate cancer screening be re-examined again in five years (2004). If, however, evidence regarding the effects of screening on prostate

cancer mortality becomes available before that scheduled review, the Advisory Committee recommends immediate review of the current policy."

Efforts to disseminate the Advisory Committee recommendation on prostate cancer screening will focus on medical professionals as well as on the general public. This paper is a part of that effort. Educational offerings for medical personnel will explore the issues surrounding prostate cancer screening, diagnosis, and treatment to assist in management of individual patients.

Education for the general public will take the form of pamphlets encouraging men to speak with their doctors about prostate cancer screening. One pamphlet is included as a tear out sheet in this journal. It may be copied and given to patients or left in the office waiting area. Another set of pamphlets currently under development will be aimed at men at average risk and those at high risk. The education brochures will instruct men to speak with a doctor to determine whether or not to be screened. By providing complete information about prostate cancer screening, doctors and patients together can develop an individual screening plan that meets the physical and psychological needs of the patient until further research is available to clarify the question of who should be offered widespread prostate cancer screening.

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Running the Numbers

A Periodic Feature to Inform North Carolina Physicians and Their Patients
About Current Topics in Health Statistics

Paul A. Buescher, PhD, Editor

Coronary Heart Disease and Stroke in North Carolina

Heart disease and stroke are, respectively, the first and third leading causes of death in North Carolina; together in 1999 they killed 24,735 North Carolinians. These mortality rates are high compared to other states: According to the National Center for Health Statistics, our state has the fourth highest death rate from stroke and the seventeenth highest from heart disease among the 50 states. Although the large mortality burden of these diseases is well recognized, little has been known about their prevalence among North Carolinians.

In 1999, for the first time, North Carolina included the Cardiovascular Disease (CVD) Module in the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an ongoing telephone survey of health risk factors and conditions among adults (18 years of age or older) designed by the Centers for Disease Control and Prevention (CDC) and conducted in all US states. The CVD Module includes questions on history of doctor-diagnosed heart attack, angina, or other coronary heart disease (CHD), and stroke. The 1999 BRFSS surveyed 2,445 North Carolinians. The BRFSS data are weighted to be representative of the entire North Carolina adult population.

Results from the BRFSS indicate that an estimated 9% of North Carolina adults, or more than 500,000 persons, had a history of diagnosed CHD or stroke, or both. Nearly 7% (380,000) had a history of CHD, and more than 3% (180,000) had a history of stroke. The prevalence of CHD was higher among men than women (9% vs. 5%, respectively), but the prevalence of stroke was similar among men and women (4% vs. 3%). The prevalence of CHD was similar for blacks and whites (6% vs. 7%), but the prevalence of stroke was somewhat higher among blacks than whites (5% vs. 3%). The prevalence of CHD increased steadily with age, with the highest prevalence among persons aged 75 or older (24%). Stroke prevalence also increased with age; 13% of persons aged 75 or older reported diagnosed stroke. Among the 19 states that included the CVD module in the BRFSS in 1999, North Carolina's reported prevalence of stroke (3.3%) was exceeded only by that of Kentucky (3.4%). The CHD prevalence for North Carolina was very close to the median for the 19 states.

The BRFSS data indicate that one in eleven North Carolina adults had a history of CHD and/or stroke, and, for those aged 75 years or older, the prevalence was nearly one in three. A limitation of these data is that the survey respondents are relied upon to report accurately over the telephone a doctor's diagnosis of CHD or stroke. Also, the BRFSS interviews only persons living in residential households; residents of long-term care or rehabilitation facilities, who are probably more likely to have had CHD or stroke, are not surveyed. Despite these limitations, the BRFSS is currently the only source of estimates of the prevalence of CHD and stroke among North Carolina adults. This information is an important supplement to mortality and hospital discharge data, giving a more complete picture of the epidemiology of these diseases.

Note: A publication of results from the BRFSS, titled *Health Risks Among North Carolina Adults: 1999*, is available at <http://www.schs.state.nc.us/SCHS/about/programs/brfss> under "publications." This report includes more detailed data on the prevalence of CHD and stroke in the state.

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From the State Center for Health Statistics

www.schs.state.nc.us/SCHS

North Carolina Department of Health and Human Services



Colorectal Cancer Screening in North Carolina

Community Clinicians' Perspectives

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Politics often makes strange bedfellows, but is there an odder couple in the US Senate than Jesse Helms (R-NC), champion of the conservative Republican right, and Ted Kennedy (D-MA), darling of the Democratic liberal left? One issue facing the 107th Congress united these polar political opposites: colorectal cancer screening. Senators Helms and Kennedy introduced and co-sponsored legislation to increase access to colorectal cancer screening (S710, "Eliminate Colorectal Cancer Act").

Colon cancer and colorectal cancer screening deserve attention from the public, the medical community, and government, as well as from politicians. Long in the shadow of breast cancer and more recently eclipsed by debate over prostate cancer screening, colorectal cancer is the forgotten major cancer, receiving less media attention and less research funding than either of these two other prominent cancers.^{1,2} Yet in 2001 more than 56,000 men and women in the United States will die from the disease—more deaths than from either breast (40,200) or prostate cancer (31,500).³ This year, 4000 North Carolinians will be diagnosed with, and 1700 will die from, colorectal cancer.³

Expert groups from the American Cancer Society, the American Gastroenterological Association, and the US Preventive Services Task Force support periodic screening of asymptomatic, average-risk persons beginning at age 50.⁴⁻⁶ Routine screening for colorectal cancer is covered by Medicare.⁷ All groups support periodic screening with a fecal occult blood test (FOBT) or flexible sigmoidoscopy or both.

In rigorous studies, both tests have reduced colorectal cancer mortality.^{8,9}

Despite the prevalence of disease, strong evidence that screening is effective, and consensus support from experts, screening performance is low. Nationally, in 1999, 44% of persons 50 years and older reported having had an FOBT in the past year or colon endoscopy in the past five years.¹⁰ We do even less well in North Carolina. In 1999, 30% of persons 50 years and older had used a take-home FOBT kit in the past year, and only 53% had ever used one. In addition, 31% had had a colon endoscopy in the past five years, and only 39% had ever had one.^{10,11}

Barriers to screening include a variety of procedural, patient, provider, and health care system factors.¹² As with other cancer screening procedures, a doctor's recommendation is the most powerful single factor promoting colorectal cancer screening. Improving clinicians' adoption of the idea of colorectal cancer screening is a critical first step in improving screening performance.¹²

In 1997 and 1998, we surveyed primary care doctors in North Carolina to determine their training for, attitudes about, and current practices of screening for colorectal cancer with FOBT and flexible sigmoidoscopy. Data from this survey have been used by the North Carolina Advisory Committee on Cancer Coordination and Control and its Early Detection Subcommittee to develop strategies to help primary care doctors in North Carolina increase colorectal cancer screening.

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Methods

Between November 1997 and May 1998, we used self-administered questionnaires to survey family practitioners, general practitioners, and general internists who were actively practicing in non-federal, non-academic, and non-training primary care settings in North Carolina. Potential respondents were identified using 1997 licensure data from the NC Medical Board. The UNC School of Medicine's Institutional Review Board reviewed and approved the study.

Before the survey, we mailed post cards to verify addresses and current practice status. Doctors who did not respond received up to three questionnaires, each followed by postcard reminders one week later. After the last regular mailed questionnaire, we contacted a random 10% of non-respondents by telephone or fax. A pocket pharmacy guide was offered as an incentive for survey completion.

In addition to personal and practice characteristics, the survey asked doctors about their practices of colon cancer screening with FOBT and flexible sigmoidoscopy. The survey focused primarily on flexible sigmoidoscopy, addressing attitudes towards and barriers to use of the procedure, as well as current performance and past training in the technique of sigmoidoscopy.

The initial sample consisted of 1,582 randomly selected doctors, representing approximately one half of the licensed, active, non-resident, non-federal, primary care doctors in North Carolina. After excluding 249 who no longer actively practiced, were still in training, had relocated out of state, or practiced in academic or federal settings, we received responses from 736 (55%) of the 1333 contacted, a rate comparable to other mailed surveys of clinicians.¹³ Response did not differ significantly by specialty.

Results

Personal and Practice Characteristics. Most (77%) respondents were men. Their average age was 46 years. The vast majority listed their primary specialty as Family Practice (58%) or Internal Medicine (37%). Most (72%) were in group practice; 46% were in single specialty practices. Only 15% worked in multispecialty group practice with a gastroenterologist. Median group size was six practitioners. For all doctors, the median number of patients seen per day was 24.

FOBT Performance. Virtually all (97%) respondents recommended periodic screening with FOBT. Among those recommending FOBT, 35% said that annual screening should start at age 50, the starting point recommended by most expert groups (see box, p. 287). Almost all the others thought that screening should begin before age 50 (20% said before age 40). A majority (79%) thought that the proper screening interval was once a year, and 11% believed the interval should

Table 1. Perceived barriers to screening with flexible sigmoidoscopy, as reported by 107 North Carolina doctors who have tried to implement screening in their practices

Time commitment is too great	61%
Equipment cost is too great	36%
Reimbursement is inadequate	32%
OSHA regulations are too cumbersome	28%
Patients do not want the test	23%

3 responses were missing; n = 104

be every one or two years. Roughly half of all physicians (54%) reported using rehydrated slides for FOBT.

Flexible Sigmoidoscopy Performance. The vast majority (92%) of respondents recommended screening with flexible sigmoidoscopy, and 43% said they performed the procedure themselves. Most (85%) agreed with expert group recommendations that colon cancer screening with flexible sigmoidoscopy begin at age 50 and be repeated every three to five years. A small minority (10%) felt that screening should begin before age 50, or should be obtained more often than every three to five years.

Among the 309 respondents who performed as well as recommended sigmoidoscopy, 61% performed 1-5 procedures per month; only 11% averaged more than 10 procedures per month. Most (84%) doctors performed the procedure in their offices using a 60 cm fiberoptic flexible scope that was cleaned manually (in 93% of cases) by a general nurse (64%) or endoscopy technician (12%). Few doctors (11%) used a 60 cm video flexible scope, and only 3% used a rigid scope. Almost all (97%) said that an average procedure took 30 minutes or less, and 48% said it took 15 minutes or less. Average depth of insertion was 50 centimeters.

Of the 360 respondents who recommended but did not perform flexible sigmoidoscopy, 85% said that a gastroenterologist did the procedure. Most (66%) procedures took place outside the doctor's practice.

Perceived Barriers to and Promoters of Flexible Sigmoidoscopy. Perceived barriers to screening with flexible sigmoidoscopy differed according to respondents' experience with the procedure. Among the 360 doctors who recommended but did not perform screening flexible sigmoidoscopy, 319 responded to questions about implementing the procedure in their practices. Of these, 107 (34%) said they had tried to implement the procedure, but had found the time commitment excessive (Table 1). Equipment costs, inadequate reimbursement, and regulatory restrictions were other significant barriers. Fewer than ten respondents named lack of training or proficiency as barriers, and only two said that malpractice or litigation costs were.

Table 2. Factors that could interest 189* North Carolina doctors in implementing screening flexible sigmoidoscopy in their practices

Training	33%
Increased reimbursement	20%
Additional time	11%
Additional equipment/logistical support	10%
More patient education/demand	4%
Fewer regulations	1%

*36 (19%) said that nothing could interest them in flexible sigmoidoscopy.

Table 3. Patient barriers to colon cancer screening as perceived by 669 North Carolina primary care doctors

Patient barriers	FOBT*	Flexible sigmoidoscopy
Inconvenience	82%	68%
Embarrassment	56%	59%
Fear of findings	54%	41%
Cost	19%	61%
Fear of pain/discomfort	NA	92%
Procedure not efficacious	9%	5%
Other	11%	6%

*Two responses were missing; n=667.

Among the 212 respondents who had not tried to implement screening sigmoidoscopy, 189 responded to a question about what might promote their interest in such screening, including 36 who said that they were not interested in performing the procedure (Table 2). The remaining 153 doctors said that additional training and increased reimbursement would promote use, but few considered that additional time and even fewer that relaxed regulation and increased patient demand would.

The 58 doctors who neither recommended nor performed flexible sigmoidoscopy identified a number of barriers against recommending the procedure. They believed that the procedure was ineffective (45%), expensive (43%), and inconvenient for patients (34%). Also, 24% said that they referred patients for colonoscopy or felt that flexible sigmoidoscopy had shortcomings.

Training in Flexible Sigmoidoscopy. Half (51%) of the respondents had received training in sigmoidoscopy as residents. Training came primarily from gastroenterologists (50%) or primary care doctors (31%). Among doctors who

recommended but did not perform flexible sigmoidoscopy, 60% said that they would be interested in free training in the procedure.

Perceived Patient Barriers to Colon Cancer Screening.

Respondents estimated that only 43% of the patients to whom they recommended flexible sigmoidoscopy had had the procedure performed (the survey did not ask about FOBT). Perceived patient barriers to compliance with screening recommendations differed somewhat by procedure (Table 3). The most commonly identified patient barriers were inconvenience (FOBT) and fear of pain and discomfort (flexible sigmoidoscopy). Cost was a major perceived patient barrier to flexible sigmoidoscopy, but not FOBT. More than half of respondents identified inconvenience, fear of what might be found, and embarrassment as patient barriers to each procedure. Few believed that patients' perceived lack of efficacy was a barrier to either FOBT or flexible sigmoidoscopy.

Role of non-MD Clinicians in Colon Cancer Screening.

Doctors generally believed that nurse practitioners and physician assistants have a role in cancer and colon cancer screening (Table 4). The one exception was flexible sigmoidoscopy; only 22% of respondents thought it appropriate for non-MD clinicians to perform flexible sigmoidoscopy.

Discussion

Periodic screening and the removal of polyps can prevent colorectal cancer and reduce mortality. The question is how to increase screening. In 1999, half or fewer of North Carolinians aged 50 years and older reported having ever had an FOBT or flexible sigmoidoscopy, and only 30% had had one within the recommended time frame. In contrast, 84% of women aged 40 and older reported ever having had a mammogram and a breast exam; 77% of women aged 50 years and older had had the procedures within the recommended time frame (prior two years).^{10,11}

Since recommendation by a doctor is a major motivator for screening, we need to find ways to promote such recommendations. Increasing physician awareness is not the answer—primary care doctors in North Carolina are well aware of the need for and importance of colorectal cancer screening. More than 90% of those who responded to our survey reported recommending FOBT and flexible sigmoidoscopy. Doctors were aware of the recommended starting age and appropriate screening intervals, although two-thirds said they started screening with FOBT before age 50, the starting point suggested by most expert groups.

Getting more community primary care doctors to perform screening sigmoidoscopy in their practices is an option. According to our survey, only a minority of primary care

practitioners actually performed flexible sigmoidoscopy in their offices. And even those who did, did not do it often: 89% reported 10 or fewer procedures per month and 61% reported 5 or fewer procedures monthly. Using non-MD clinicians to carry out screening sigmoidoscopy might be helpful. These personnel can perform high-quality screening sigmoidoscopy¹⁴ and, if supervised, can legally perform the procedure in North Carolina. But only a minority of doctors said that it was appropriate for non-MD clinicians to perform screening sigmoidoscopy.

Increasing community practitioners' performance of screening sigmoidoscopy faces a number of challenges. Those who had not tried to implement screening sigmoidoscopy said they needed training in how to perform the procedure, but training, which usually includes supervised performance of 20-30 procedures, could be both costly and inconvenient. Once trained, primary care doctors face a different set of barriers, most often lack of time to perform the procedure, but also lack of equipment and logistical support, low reimbursement, OSHA regulations, and lack of patient demand and compliance.

Furthermore, doctors perceive a number of patient barriers to screening. Our respondents believed that fewer than half of the patients to whom they recommend screening sigmoidoscopy actually obtain the procedure. Fear of pain or discomfort (92%) was the most frequently cited barrier, as well as inconvenience, cost, and embarrassment (59%-68%). Inconvenience was cited by 82% as a barrier to patient compliance with FOBT.

Several limitations apply to our results. First, 45% of the doctors contacted never responded to the survey. Respondents and non-respondents did not differ in demographic characteristics, but they could have differed in other important, unmeasured ways, such as non-respondents being less likely to recommend or perform colorectal cancer screening. Second, doctors' self-reported behavior generally overstates actual behavior.¹⁵ Third, the surveys took place in 1997 and 1998, prior to Medicare approval of reimbursement for colon cancer screening. Perceived barriers to screening and screening behavior itself may have changed since then, although changes in colorectal screening have generally not been rapid. Despite these limitations, our survey is the best available representation of what community primary care doctors in North Carolina do and think about colorectal cancer screening.

In June 2001, the North Carolina Advisory Committee on Cancer Coordination and Control issued its second five-year Cancer Control Plan.¹⁶ The goals for colorectal cancer screening include increasing to 60% the percentage of persons aged 50 years and older who have had an FOBT in the past year and increasing to 50% the percentage who have had a colon endoscopy within the past five years. The Plan also emphasizes addressing racial, economic, and other disparities in colorectal cancer and colorectal cancer screening.

Table 4. Perceptions of the role of non-MD clinicians (NMDCs) in colorectal and other cancer screening by 666 North Carolina primary care doctors

Procedure	Appropriate for NMDCs?
Order mammogram	92%
Order fecal occult blood test	90%
Perform Pap smear	87%
Perform digital rectal examination	83%
Order prostate specific antigen test	78%
Perform flexible sigmoidoscopy	22%

Based in part on the results of this survey and other data, the Cancer Control Plan proposes strategies to help doctors overcome barriers to colorectal cancer screening. Specific doctor and practice-targeted strategies include:

- ◆ Promoting training opportunities, particularly in use of flexible sigmoidoscopy, so that those interested but not yet trained can begin to offer services;
- ◆ Offering workshops led by community practitioners who can provide practical, hands-on advice about how to overcome logistical and other barriers to colorectal cancer screening in community practices;
- ◆ Making available tracking systems to help providers organize and deliver screening services in their practices;
- ◆ Developing regional referral resources for those who cannot or do not wish to perform colorectal cancer screening services in their offices.

Strategies directed only toward providers are not sufficient. Increasing recommendations to obtain screening and increasing practice capacity to provide screening helps little if patients do not comply. There are significant barriers to patient compliance.¹² For example, a Veterans Administration study conducted in North Carolina found that previously unscreened patients were willing to give up three months of life to avoid sigmoidoscopy and six months of life to avoid colonoscopy.¹⁷

As has been the case for breast cancer screening with mammography, strategies to increase colon cancer screening should target both providers and the community. Recommendation and simple practice-based interventions can increase compliance. In one study, use of an 11-minute videotape, a targeted patient brochure, and chart reminders increased performance of FOBT and flexible sigmoidoscopy.¹⁸

The 2001-2006 Cancer Control Plan also proposes public education strategies to increase awareness about the need for and availability of colorectal cancer screening. The Plan proposes to increase patient access to screening (through expanded insurance coverage and screening in public health departments) and follow-up care. The public education

strategies, which target the public directly and through provider settings, include

- ◆ Making learner-appropriate and culturally-appropriate educational materials on colorectal cancer risk and screening available through public health departments, the Internet, and provider offices;
- ◆ Promoting colorectal cancer awareness through local media, organizations, and worksites, especially during colorectal cancer awareness month (March).

Colorectal cancer screening is a moving target. Expert groups have achieved consensus about FOBT and flexible sigmoidoscopy, but several groups support additional procedures, such as digital rectal exam, colonoscopy, or double contrast barium enema, in addition to or as alternatives for FOBT and flexible sigmoidoscopy.⁴ However, we do not yet have strong evidence that these other procedures reduce mortality.^{5,6}

Screening colonoscopy may soon become a consensus alternative to FOBT and flexible sigmoidoscopy. Although colonoscopy is more expensive, and requires sedation and extensive preparation, it provides access to the proximal as well as the distal colon and can find cancers and polyps not detected following flexible sigmoidoscopy.¹⁹ Some have suggested that screening colonoscopy once every ten years may be a cost-effective way to carry out colorectal cancer screening. As of July 2001, Medicare coverage includes screening colonoscopy for normal risk individuals.⁷ Researchers are also developing new screening procedures, such as "virtual colonoscopy," a non-invasive technique using thin-section, helical computed tomography.²⁰

Until such virtual tests become reality, doctors and patients in North Carolina need to use the available, effective procedures to screen for our second most deadly cancer. The North Carolina Advisory Committee on Cancer Coordination and Control has identified target goals and strategies to promote colorectal cancer screening in North Carolina so that it may begin to approach the levels of success achieved by breast cancer screening. Senators Helms and Kennedy have set aside their differences to help promote colorectal cancer screening. Doctors and patients in North Carolina would benefit by following their lead.

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Current Recommendations from Three Expert Groups for Colorectal Cancer Screening of Asymptomatic Persons at Average Risk

<i>Test/Procedure</i>	<i>Beginning at Age</i>	<i>Interval</i>	<i>Recommended by*</i>
Fecal Occult Blood Test (FOBT)	50 years	Yearly	ACS, AGA, USPSTF,
Flexible Sigmoidoscopy	50 years	5 years Unspecified	ACS, AGA USPSTF
FOBT/Flexible Sigmoidoscopy	50 years	Yearly/5 years Yearly/Unspecified	ACS, AGA USPSTF
Colonoscopy	50 years	10 years	ACS, AGA
Double Contrast Barium Enema	50 years	5 years	ACS, AGA

*ACS: American Cancer Society¹; AGA: American Gastroenterological Society²; USPSTF: US Preventive Services Task Force³

Notes: The above recommendations are drawn from three expert groups. Other expert groups (National Cancer Institute, National Comprehensive Cancer Network, American College of Physicians, and others) either have statements of evidence and/or recommendations regarding colorectal cancer screening or individual screening tests. The above recommendations refer to asymptomatic, average risk persons. Screening recommendations for individuals at increased or high risk (history of adenomas, family history, history of colorectal cancer, etc) differ. For more information on screening for higher risk individuals, please refer to each expert group's complete recommendation. The above five strategies represent options and should not be combined with one another. Expert groups differ on the equality of the alternatives.

- 1 Regarding choice of test/procedure, ACS advocates informed patient decision-making that considers: test accuracy, prevention potential, costs, and risks. See Reference 4 for the complete ACS recommendation. See also: http://www3.cancer.org/cancerinfo/load_cont.asp?ct=10&doc=28&Language=English.
- 2 Other organizations endorsing the AGA's recommendations include: American College of Gastroenterology, American Society of Colon and Rectal Surgeons, American Society of Gastrointestinal Endoscopy, Crohn's and Colitis Foundation of America, Oncology Nursing Society, and Society of Gastrointestinal Endoscopic Surgeons. Regarding choice of test/procedure, the Association advocates consideration of: strength of evidence, size of benefit, clinical performance, effectiveness in preventing colon cancer, simplicity, safety, patient acceptance, cost, and cost effectiveness. See Reference 6 for the complete AGA recommendation. See also: <http://www.gastro.org/phys-sci/colcancer/index.html>.
- 3 The USPSTF recommends screening with either FOBT, flexible sigmoidoscopy, or both but does not find sufficient evidence to say which strategy is superior. The Task Force does not find evidence to recommend for or against screening with colonoscopy or double contrast barium enema. The Task Force does not discuss screening for persons at increased or high risk. The above recommendations are included in the 2nd Edition of The Guide to Clinical Preventive Services. A 3rd edition, which will update colorectal cancer screening, is underway. For more details on the update, visit: <http://www.ahrq.gov/clinic/uspstfix.htm>. See Reference 5 for the complete current Task Force recommendation. See also: <http://www.ahrq.gov/clinic/cpsix.htm>.



Colorectal Cancer in North Carolina

Risk Factors, Screening Behaviors, Incidence, Stage at Diagnosis, and Mortality

Elizabeth Conlisk, PhD

Colorectal cancer ranks fourth in incidence and second as a cause of cancer-related deaths in the United States. An estimated 135,400 new cases will be diagnosed and 56,700 patients will die from colorectal cancer in 2001.¹ These large numbers mask the fact that colorectal cancer is one of the few cancers that not only can be detected early but can actually be prevented by regular screening. Fecal occult blood tests (FOBTs) and screening endoscopy (sigmoidoscopy and colonoscopy) can detect precancerous polyps, which can be removed before becoming malignant, thereby preventing cancer from developing. Regular screening can also diagnose early disease, resulting in better treatment options and reduced mortality. In 1996, the US Preventive Task Force recommended that at age 50 people begin FOBT and have a "periodic" (period not defined) flexible sigmoidoscopy.

Given the heavy burden of colorectal cancer, and the interventions available to reduce this burden, this report summarizes the data available on colorectal cancer in North Carolina, including potential risk factors, screening, incidence, stage at diagnosis, and mortality.

Methods

Information about use of screening tests and some behavioral risk factors for colorectal cancer were available from the annual North Carolina Behavioral Risk Factor Surveillance System (BRFSS), a standardized telephone survey of non-institutionalized adults aged ≥ 18 years.² Respondents were asked whether they had ever had an FOBT administered at home, whether they had ever had a sigmoidoscopy, and the most recent date at which each test had been performed.

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Currently, BRFSS does not include questions on risk factors for colorectal cancer, so information about potential colorectal cancer risk factors was obtained from questions asked by BRFSS for other purposes: fruit and vegetable consumption, exercise, aspirin use, estrogen replacement therapy, and cigarette smoking. No data were collected on other (and possibly even more important) risk factors. Regular exercise was defined as participating in any physical activity for a total of 20 or more minutes three or more times per week. Respondents who had smoked at least 100 cigarettes in their lifetime and who currently smoked on some or all days were considered current smokers.

Unless otherwise noted, prevalence estimates were computed for the three-year period 1997-1999. All data were based on self-report. Responses were weighted to reflect the age, race, and gender distribution of adults in North Carolina, and the probability of selection. Standard errors of the mean and 95% confidence intervals were calculated using Survey Data Analysis software.³ Differences were considered statistically significant at the 0.05 level if the 95% confidence intervals did not overlap.

Urban residence was defined as living in a county that was classified as more than 50% 'urbanized' by the 1990 census. An urbanized area was defined as a community that, together with its adjacent densely settled surrounding territories, had a minimum of 50,000 persons. Data are presented for people 50 years of age and older.

Data on colorectal cancer incidence, stage at diagnosis, and mortality for the years 1990-1997 were provided by the North Carolina Central Cancer Registry. Stage at diagnosis was assigned by trained tumor registrars, and classified as local, regionally, or distantly spread according to the General Summary Stage used by the North American Association of Central Cancer Registries.⁴ Incidence and mortality data for 1990-1997 were compared to the Surveillance, Epidemiology and End Result (SEER) Program's national estimates.⁵ The North Carolina data were age-adjusted to the 1970 US population to make them comparable to SEER data.

Table 1. Percentage of North Carolina adults 50 years of age or older who reported behaviors associated with decreasing or increasing risk of colorectal cancer

	5 servings/day of fruits & vegetables	regular exercise	aspirin every 1-2 days	estrogen therapy ¹	current smoker
Year data collected	1998	1998	1999	1999	1997-99
Sample size ²	1001	1002	1034	657	3490
Overall	24±3	36±4	38±3	33±4	18±2
Gender					
Women	29±4	36±4	33±4	33±4	16±2
Men	18±5	37±7	44±6	—	20±3
Race					
White	26±4	40±4	40±4	35±5	17±2
Black	16±7	18±7	26±7	19±8	19±4
Age					
50-59	20±5	35±7	32±5	45±7	25±3
60-69	26±6	42±7	42±6	32±7	16±3
70-79	31±7	36±7	43±7	25±7	11±2
80+	17±8	21±14	44±10	7±6	3±2
Education level					
8 th grade or less	15±8	22±12	46±13	7±6	15±4
Some high school	21±7	20±7	31±8	21±9	26±4
Completed high school	25±6	38±7	39±6	35±7	19±3
Some college/technical school	25±7	44±8	36±7	42±10	16±3
College graduate	32±8	51±9	39±7	44±10	12±3
Household income					
<15,000 \$/yr	18±7	29±11	38±9	13±7	23±4
15,000-34,999 \$/yr	20±6	32±8	39±9	34±9	20±4
35,000-49,999 \$/yr	30±7	43±7	41±7	43±9	17±3
50,000-74,999 \$/yr	27±13	46±16	26±11	62±18	21±6
≥75,000 \$/yr	36±13	64±13	41±11	59±16	11±4
Residence					
Urban	23±5	36±5	38±5	37±6	18±2
Rural	25±4	37±5	38±5	29±5	17±2

¹Excludes 9 premenopausal women

²Given the different sample sizes for the columns, the sample size for each demographic group could not be easily displayed. See Table 2 for the approximate proportion of respondents in each subgroup.

Results

Risk Factors. BRFSS data on five behaviors that are associated with colorectal cancer are presented in Table 1. Only one-quarter of North Carolinians over age 50 consume five or more servings of fruits and vegetables per day. Approximately one-third exercise regularly, and one-third take an aspirin every one or two days. Women were significantly more likely than men to consume five servings of fruits and vegetables daily, but significantly less likely to take an aspirin every 1-2 days. One-third of women report using estrogen replacement therapy (ERT), but use declined dramatically with age, from 45% of women age 50-59 years to 7% of

women age 85 years and older. Whites were significantly more likely than blacks to exercise regularly, take aspirin every 1-2 days, and currently use ERT. Three of the four protective behaviors (high fruit and vegetable intake, regular exercise, use of ERT) tended to be more prevalent in respondents with more education and income; no trend was observed for regular aspirin use. Approximately 17% of North Carolinians over age 50 reported that they currently smoke; this percentage declined dramatically with increasing age and was lowest among those with the highest education and income. There were no statistically significant differences between urban and rural residents.

Screening. For the years 1997-1999, more than half of

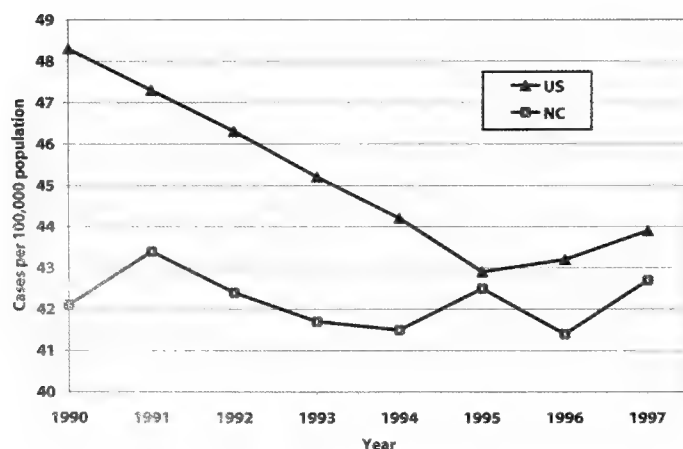
Table 2. Percentage of North Carolina adults aged 50 years or older who had colorectal cancer screening 1997-1999

	n	% Used home FOBT		% had sigmoidoscopy	
		Ever	Past year	Ever	Past 5 years
Overall	3507	53±2	30±2	39±2	31±2
Year					
1997	1444	52±3	27±3	39±3	31±3
1998	1003	54±4	32±4	40±4	30±4
1999	1060	52±3	30±3	39±3	31±3
Gender					
Women	2196	55±2	32±2	39±2	29±2
Men	1311	50±3	26±3	40±3	33±3
Race					
White	2792	54±2	30±2	40±2	30±2
Black	598	48±5	29±5	37±5	33±5
Age					
50-59	1231	46±3	25±3	30±3	25±3
60-69	1010	57±4	32±3	45±4	34±3
70-79	905	58±4	34±4	47±4	37±4
80+	361	54±7	28±6	43±7	30±6
Education level					
8 th grade or less	435	43±6	23±6	33±6	26±6
Some high school	604	48±5	26±5	34±5	27±4
Completed high school	1097	50±4	29±3	38±4	30±3
Some college/technical school	653	57±4	34±4	39±4	29±4
College graduate	683	63±4	34±4	50±4	40±4
Household income					
<15,000 \$/yr	628	41±5	20±4	34±5	25±4
15,000-34,999 \$/yr	708	52±5	27±4	38±4	29±4
35,000-49,999 \$/yr	812	55±4	33±4	40±4	31±4
50,000-74,999 \$/yr	244	56±8	29±7	42±8	31±7
≥75,000 \$/yr	260	58±7	33±6	47±7	39±7
Residence					
Urban	1526	59±3	34±3	42±3	33±3
Rural	1861	47±3	26±3	37±3	29±3

respondents reported having had at least one home FOBT, and approximately 30% reported one in the previous year (Table 2). Approximately 40% reported ever having had a sigmoidoscopy and 30% had one during the prior five years. In the three-year span during which these questions were asked, there were no temporal trends in the use of any of the screening methods. The prevalence of FOBT in the prior year was significantly higher for women than men (32% vs 26%), but no other gender or racial differences were statistically significant. The likelihood that respondents had been screened, ever and in the prior year, by FOBT or endoscopy, increased with age until age 79, at which point it declined; the likelihood of each screening procedure increased steadily with increasing education and income. Urban residents were significantly more likely than rural residents to have ever had a home FOBT (59% vs 47%) and to have had one in the past year (34% vs 26%).

Incidence. In North Carolina between 1990-1997, there was no real decline in yearly incidence of colorectal cancer, which remained close to 42 cases per 100,000 population (Figure 1). In contrast, there was a steady decline in colorectal

Figure 1. Colorectal cancer incidence, 1993-1997



cancer incidence in the nation (from 48/100,000 in 1990 to 44/100,000 in 1997). Thus, incidence in NC remained lower than that recorded in the national SEER data, but the gap has narrowed.

Incidence rates for 1993-1997 were higher for men than women, and for blacks than whites, both in North Carolina and in the nation (Table 3). In North Carolina, the incidence in black women was 26% higher than in white women, compared to a 21% higher incidence nationally. In contrast, the incidence in North Carolina black men is essentially the same as in white men. Thus, the black-white gap in colorectal incidence in North Carolina is entirely due to the gap among women. Although the incidence of colorectal cancer is lower in North Carolina than in the nation, the advantage was not observed at all ages. The incidence in North Carolina is actually

Table 3. 1993-1997 colorectal cancer incidence and mortality rates (cases/100,000 population) for North Carolina and the US

	Incidence		Mortality	
	NC	US ¹	NC	US ¹
Total	42.0	43.9	17.0	17.2
Gender				
women	35.9	37.2	14.5	14.4
men	50.4	52.4	20.6	21.0
Race				
white	40.8	43.5	15.7	16.8
black	45.2	50.2	22.8	22.8
Gender/Race				
black women	42.6	44.7	21.0	19.7
black men	49.5	57.8	26.0	27.5
white women	33.8	36.8	12.9	13.9
white men	50.0	52.0	19.4	20.6
Age				
30-34	3.7	3.4	1.1	1.0
35-39	7.2	6.3	2.2	1.9
40-44	17.0	12.6	5.5	3.9
45-49	32.0	24.1	11.0	8.2
50-54	60.0	48.1	18.0	16.0
55-59	93.0	85.0	30.0	28.0
60-64	133.0	136.0	45.0	47.0
65-69	177.0	194.0	68.0	70.0
70-74	244.0	268.0	94.0	101.0
75-79	293.0	341.0	131.0	137.0
80-84	350.0	426.0	194.0	193.0
85+	358.0	451.0	260.0	282.0

¹National estimates from the Surveillance, Epidemiology and End Result (SEER) Program.⁵

higher in those aged less than 60 years, but because the absolute numerical incidence is small at younger ages, the incidence in older individuals determines the overall rate.

Stage at Diagnosis. Data on stage at diagnosis for the years 1993-1997 are shown in Table 4. White men were most likely to be diagnosed when the cancer was at a local stage, followed by white women. Approximately 22% of black men had distant metastases at diagnosis, compared to 16% of whites. The stage at diagnosis was more likely to be "unknown" for blacks than whites. No comparable national data were available.

Mortality. Trends in colorectal cancer mortality (Figure 2) show patterns similar to those observed for incidence. Colorectal cancer mortality in the US declined steadily from 1990-1997, but it was stable in North Carolina through the early and mid 90s, declining only in 1996 and 1997. Mortality in North Carolina is still slightly lower than in the nation, but the gap has

Table 4. Percentages of patients with localized, regionally spread, and distantly spread cancer at diagnosis

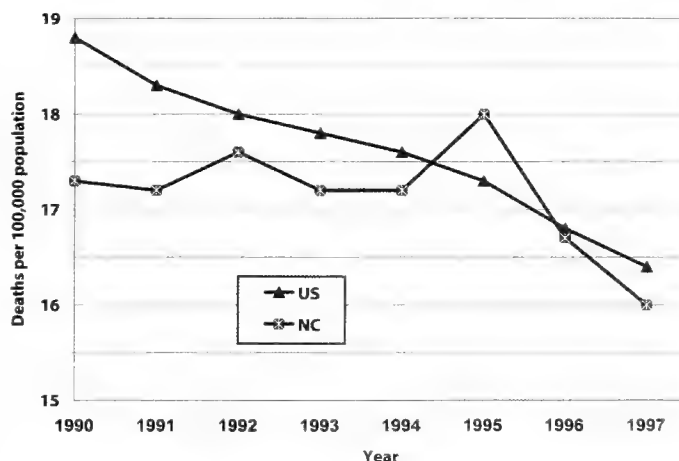
	Localized	Regional	Distant	Unknown
Black				
women	32%	40%	21%	7%
men	31%	39%	22%	8%
White				
women	35%	44%	16%	6%
men	39%	41%	16%	5%

almost closed. Among blacks the incidence of colorectal cancer was 11% lower in North Carolina than the nation for 1993-1997, but mortality was the same (22.8/100,000), suggesting a worse prognosis for blacks with colon cancer in North Carolina (Table 3). Among whites, both incidence and mortality were about 7% lower in North Carolina than in the nation. Five-year mortality rates by gender were essentially the same for North Carolina and the nation.

Racial disparities in deaths from colorectal cancer in North Carolina are even more pronounced than disparities in incidence. For 1993-1997, the mortality rate for black women was 63% higher than for white women (21/100,000 vs 13/100,000); nationally, the mortality for black women was 42% higher than for white women. Black men, who had essentially the same colorectal cancer incidence as white men, had a 34% higher mortality; a similar differential was observed nationally.

The crossover in age-specific incidence for North Carolina and the nation is also seen in the mortality data. Mortality in North Carolina is higher than that noted by SEER up until age 60, after which mortality is higher for SEER. As with incidence, the trend is more pronounced among whites than blacks.

Figure 2. Colorectal cancer mortality, 1993-1997



Discussion

In North Carolina, the incidence and mortality of colorectal cancer have remained almost constant over the past decade, but have declined markedly in the nation as a whole. National declines are ascribed to significant increases in the rates of screening for cancer, and improved treatment and follow-up. The absence of decline in North Carolina suggests that we have not yet experienced the increases in screening or improved treatment observed nationally. Unfortunately, the earliest year for which data on FOBT are available was 1997, so they cannot be used to interpret 1993-1997 incidence and mortality rates. However, recent data suggest that North Carolina does *not* lag behind the national trend towards increased screening. In 1997, North Carolinians aged 50 years or more were actually more likely than their national counterparts to report using home FOBT tests (27% vs 20%); the reported prevalence of sigmoidoscopy in the past five years was practically the same for North Carolina (30.5%) and the nation (30.3%).⁶ It is possible that colorectal cancer cases have been underreported in North Carolina. As this is being addressed, it will tend to offset any decline in incidence brought about by increased screening. It would also explain why reported rates from North Carolina have been lower than they are nationally. However, mortality data show a similar trend and that should not be affected by underreporting. Data on incidence and mortality through the year 2000 may help address some of these issues.

The most striking finding reported here is the large racial difference in colorectal cancer incidence and mortality in North Carolina and the nation. This is particularly obvious among women. Among North Carolina women from 1993-97, the incidence of colorectal cancer was 26% higher in blacks than in white; mortality was an alarming 63% higher. In black men, the incidence was similar to that in white men, but mortality was 34% higher. The higher incidence in black women may be due, in part, due to a higher prevalence of colorectal risk factors. Blacks as a group reported fewer of the behaviors associated with decreased risk of colorectal cancer (the sample size was too small to analyze by race and gender).

National BRFSS data show that blacks have lower rates of fruit and vegetable consumption, regular exercise, and aspirin use than whites.^{7,8} Still, it is not clear that the risk-factor differences observed in North Carolina are large enough to explain the differences in incidence. No racial differences were reported in screening behaviors in North Carolina for 1997-1999, or in the national BRFSS data for 1997;⁹ however, as mentioned above, 1997 data cannot not be used to explain incidence and mortality rates for 1993-1997. National data from BRFSS and the National Health Interview Survey of the 80s and early 90s showed higher rates of proctoscopy, digital rectal exams, and FOBTs in whites than in blacks.^{10,11} The excess mortality seen in blacks could be due to delay in diagnosis until the cancer is at an advanced

stage, and to sub-optimal follow-up and treatment. Unfortunately, we have no data on treatment of colorectal cancer in North Carolina.

The findings described in this paper must be interpreted with some caution. First, the data on risk factors and screening behaviors were subject to the biases of self-report. Furthermore, they were collected by telephone survey, which means they do not reflect the behaviors of people who did not own telephones (approximately 5% of North Carolina households), who were institutionalized (approximately 5% of adults aged 65 years or more¹²), or who refused to participate. For 1999, the response rate of eligible people contacted was 75%.¹³ Second, not all cancer cases are reported to the Central Cancer Registry (the Registry is estimated to have been 90% complete for the years 1993-1997), so we have probably underestimated incidence. Third, data on race are presented because of the strong correlation between race and factors related to disease prevention and health care; they are not meant to suggest a genetic basis for group differences.

Conclusion

Colorectal cancer is a leading cause of death (1700 North Carolinians in 2000). There are large racial disparities in the incidence of colorectal cancer among women, and even larger racial disparities in mortality. Given the opportunities to prevent or detect colorectal cancer at early stages, it is critical that these disparities be investigated and interventions designed to lower the burden of colorectal cancer among all North Carolinians.

Acknowledgment. The author would like to thank the staff at the Central Cancer Registry and the Behavioral Risk Factor Surveillance System in the North Carolina Center for Health Statistics for providing the data for this report, and for their ongoing efforts to collect high-quality health-related data for North Carolina.

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Better Pap Tests Using Liquid-Based Technology

Nancy Gardner, MT (ASCP)

Every year, approximately 12,800 American women are diagnosed with and 4,600 women die from invasive cervical cancer.¹ The good news is that incidence and mortality rates have decreased over the past several decades, mainly as a result of the widespread use of Pap smear screening.² The Pap test has been effective in detecting cervical pre-cancer and cancer lesions for over 50 years. Since its introduction, Pap test methodology has remained basically unchanged—until recently.

Limitations of the Conventional Pap Test

Despite the success noted above, Pap smear testing has limitations. Generally, it is susceptible to two kinds of errors: (1) sampling and preparation errors, and (2) interpretation errors. Sampling errors can occur when cells are never actually collected or are discarded with the sampling device without being transferred to the slide. Studies have shown that, on average, more than 80% of the cell sample is discarded with the sampling device. This means that the cells that actually make it to the slide may be a nonrepresentative subsample of cervical cells.³ Furthermore, making the smear itself produces results of variable quality. It is difficult to spread the sample evenly across the slide without creating some thick, dense areas, and other regions where cells begin to dry before they are fixed. Interpretation errors arise when blood, mucus, or other nondiagnostic debris obscures the slide. In addition, overlapping of cells and distortion due to air-drying complicate the evaluation of cell changes. The net result of these errors is that a large number of Pap smears give inconclusive or ambiguous results (reparative changes and atypical cells of undetermined significance).

The limitations associated with the conventional Pap smear increase the potential for false-negative readings (find-

ing “no evidence” of abnormal cells even though they are actually present). A study by Joseph et al⁴ found that 90% of false negative Pap smear results could be attributed to sampling error. Gay et al⁵ evaluated 339 patients diagnosed with cervical malignancy over a four-year period; 20% were found to have had false negative smears. On review and rescreening of patients, it was found that 62% of false negative smears were due to sampling error and 38% due to screening or interpretation error.

New Pap Test Technology Offers Improvements

Liquid-based Pap tests have been developed to diminish both preparation and screening errors. In May 1996, the FDA approved the *ThinPrep* Pap test for use in gynecological Pap testing, noting that it was “significantly more effective than the conventional Pap smear for the detection of Low Grade Squamous Intraepithelial Lesions (LSIL) and more severe lesions in a variety of patient populations. Specimen quality with the *ThinPrep* System is significantly improved over that of conventional Pap smear preparation in a variety of populations.”⁶

In the *ThinPrep* process, the cell sample is collected in the usual manner using FDA-approved collecting devices (a combination of plastic spatula and endocervical brush or a cervical broom). The sample is rinsed from the collecting device directly into a vial of preservative solution. Virtually all of the cells are rinsed from the collecting device into the solution. The vial of preservative containing the cell sample is sent to the laboratory where it is placed into the *ThinPrep* processor. Gentle dispersion is used to break up blood, mucus, and nondiagnostic debris while thoroughly mixing the cell sample. The cells are collected under gentle vacuum on the surface of a specially designed filter and then transferred to a glass slide. After the slide is placed in a fixative solution, it is stained by the Papanicolaou staining method and examined under a microscope. As a result of this process,

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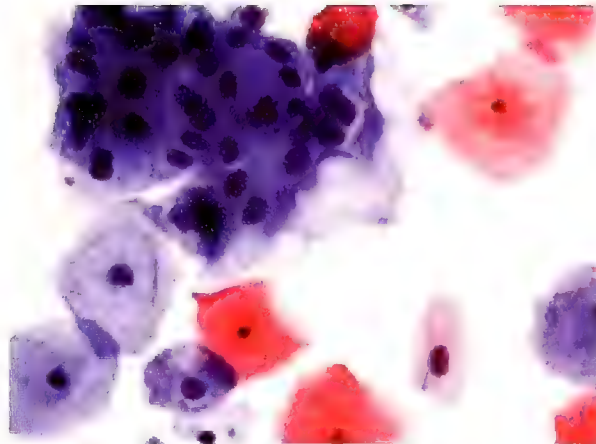
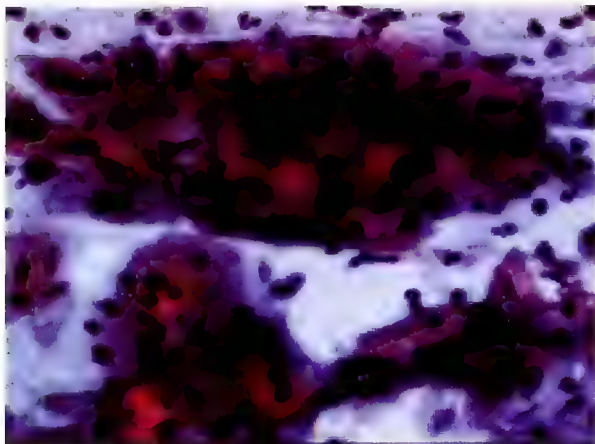


Figure. Cell samples gathered by using the conventional Pap smear (left) and by liquid-based *ThinPrep* method. *ThinPrep* gives more clearly defined cellular detail, with less nondiagnostic debris. Slides courtesy of Cytyk Corporation.

the *ThinPrep* slide contains a more representative cell sample; because it consists of a mono-layer of well-preserved cells, cellular detail is enhanced and blood, mucus, and nondiagnostic debris are gone (See Figure).

The Cytology Laboratory of the North Carolina State Laboratory of Public Health (SLPH) participated in very early clinical trials of the *ThinPrep* Pap test. In the study, 568 paired slides were examined.⁷ Enhanced efficacy of the *ThinPrep* Pap test was evident in the improved quality of the slide; four abnormalities were detected on *ThinPrep* slides that were not found on reading of the matching conventional Pap smears.

Cytec Corporation, the maker of *ThinPrep*, conducted a second round of clinical trials. They collected specimens at six sites and included samples from both routine screening and high risk patients (97% of Pap tests done annually in the United States are for screening purposes). In these patients, detection of Low Grade Squamous Intraepithelial Lesions (LSIL) and more abnormal lesions increased by 65%.^{8,9} In the high risk population, representing only 3% of annual Pap tests, the detection of LSIL and more severe lesions increased by 6%, and test quality was significantly improved.^{8,9} With the *ThinPrep* Pap test, the number of slides classified as "Satisfactory, but limited by" (SBLB) decreased by 54%.^{8,9} SBLB smears often must be repeated to obtain a more representative specimen, and this is costly (an SLPH survey of four local health departments found that costs of personnel time to locate the patient, patient education, supplies, etc. for repeat Pap smears ranged from \$90 to \$131).

Other studies of the *ThinPrep* Pap test have confirmed the increased detection of abnormalities and the reduction in number of tests that must be repeated.^{10,11} A comparison of *ThinPrep* Pap test results with cervical biopsy results demonstrated excellent correlation, indicating that the increased number of squamous intraepithelial lesions detected with *ThinPrep* Pap testing were real abnormalities.¹²

A study of the ability of *ThinPrep* to detect glandular (rather than squamous) lesions indicated that there were no significant differences in the proportion of glandular lesions detected by *ThinPrep* and conventional Pap tests.¹³ However, biopsy results indicated that the *ThinPrep* Pap test was more specific for the detection of glandular disease.

SLPH Conversion to New Technology

The Cancer Cytology Laboratory of the North Carolina State Laboratory of Public Health was established in 1948. Every year it examines about 155,000 gynecological Pap tests sent from public health facilities, mostly local health department clinics. Most of the patients are at high risk for cervical cancer, meeting one or more of the National Cancer Institute risk factors for cervical cancer: beginning sexual activity at an early age, having multiple sexual partners, smoking tobacco, failing to have regular Pap test screening, infection with human immunodeficiency virus (HIV) or human papilloma virus (HPV), and poor diet. Inflammation is present in a large proportion (about 75%) of the smears (unpublished results, NC State Laboratory of Public Health Cytology Laboratory). As might be anticipated, a large proportion of the conventional Pap smears sent to the laboratory were of less than optimal quality and difficult to evaluate because of cellular drying, or obscuration from inflammatory cells, mucus, blood, etc.

Having already documented the improved Pap smear quality and increased detection of abnormalities, the SLPH Cytology Laboratory adopted the *ThinPrep* Pap test technology in August, 1999. By July 1, 2000, 100% of the health departments using SLPH for Pap screening services had converted to *ThinPrep*.

The SLPH *ThinPrep* Pap results were closely monitored and compared with conventional Pap test results obtained

Table 1. NC State Laboratory of Public Health Pap test results calendar year 2000: conventional vs. ThinPrep

Finding	Conventional (n = 51,872)	Thinprep (n = 101,498)
Reparative changes	4.0 (2,077)*	2.5 (2,555)
Reactive changes	8.1 (4,218)	2.4 (2,429)
Atypical squamous cells of undetermined significance	5.5 (2,828)	5.1 (5,131)
Human papilloma virus	2.7 (1,390)	4.2 (4,243)
Dysplasia	3.5 (1,839)	4.8 (4,853)
Atypical glandular cells of undetermined significance	<0.1 (19)	<0.1 (27)
Carcinoma in situ	<0.1 (37)	<0.1 (26)
Squamous cell carcinoma	<0.1 (2)	<0.1 (1)
Adenocarcinoma	<0.1 (2)	0 (0)
Total abnormalities	6.3 (3,289)	9.0 (9,150)
No endocervical component	3.7 (1,912)	2.9 (2,937)
Drying	7.6 (3,967)	<0.1 (20)
Thick smear	2.7 (1,395)	<0.1 (38)
Obscuring blood	1.4 (704)	<0.1 (30)
Total satisfactory, but limited by	19.1 (9,931)	7.4 (7,539)
Unsatisfactory tests	.4 (195)	1.9 (1,916)
Total poor quality smears	19.5 (10,126)	9.3 (9,455)

*Values in parenthesis show actual number of smears with each finding. Smears may have multiple abnormal findings and poor quality factors. Listing does not include all poor quality factors.

previously (Table). Smear quality improved significantly. Samples classified as "Satisfactory, but limited by" were reduced by nearly two thirds, and benign cellular changes were substantially decreased. Overall, the number of results requiring a repeat Pap test was reduced by one half. Detection of abnormalities increased by about 50%. After gaining experience examining the *ThinPrep* slides, cytotechnologists found that it took less time to evaluate *ThinPrep* compared to conventional Pap smears. This is a benefit when there is a shortage of trained cytotechnologists.

A few problems emerged during the change to the new technology. Initially there was an increase in the number of Pap samples containing no endocervical cells. To improve endocervical sampling, the SLPH now recommends rotating the endocervical brush one-half to one full turn in one direction. Adequately rinsing the collection devices in the vial of preservative solution also lessens the problem. Once these recommendations were in place, we found fewer samples with no endocervical component using the *ThinPrep* Pap test than we found with the conventional Pap smear. We have noted an increase in tests that are unsatisfactory for examination (from 0.4% to 1.9%), mostly because the specimens on arrival in the laboratory contain too much blood (Table).

Improved Pap smear quality and increased detection of abnormalities using *ThinPrep* technology are available in private-sector health care in North Carolina. Thirty-seven cytology laboratories throughout North Carolina offer *ThinPrep* Pap testing. Some North Carolina cytology labo-

ratories offer TriPath, another liquid-based Pap test.

Collecting cells in liquid preservative offers the opportunity to use the preserved material for additional tests. Human papilloma virus testing of cells from the *ThinPrep* vial has been approved by the FDA. The presence of HPV can be suspected from cytological changes, but confirming its presence can be important in determining follow-up treatment. In the near future it should be possible to test for chlamydia, gonorrhea, and Herpes simplex virus (HSV).

Conclusion

The *ThinPrep* Pap test technology improves Pap test quality and increases detection of abnormal cervical cells. These improvements can lead to more efficient treatment, less patient anxiety and a reduction in costly repeat tests. *ThinPrep* Pap test technology offers benefits to everyone involved in the testing process. The clinician collecting the sample is relieved of having to prepare a smear. Cytopathologists and cytotechnologists get a better quality smear that can be examined more quickly and with more confidence. There are fewer suboptimal smears and smears with benign cellular changes that require a repeat test. Fewer repeat smears save time and money. The patient is the ultimate beneficiary of fewer repeat smears, increased detection of abnormalities, and greater confidence that a "negative" result means no cancer is present.

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Cancer Control and the Central Cancer Registry of North Carolina

M. Robert Cooper, MD, Dale Herman, MSPH, and Tim E. Aldrich, PhD, MPH

The North Carolina Central Cancer Registry provides core data for focused epidemiological and public health approaches to cancer control in North Carolina. Since 1946, North Carolina law has required that new diagnoses of cancer be reported. From 1970 to 1985, the state-operated cancer registry used voluntary reporting, but in 1986 concerns about environmental issues and recognition of the paucity of cancer data led to a new legislative mandate. General Statutes 130A-205 through 130A-215 address cancer registration and data based research. They established a Central Cancer Registry (CCR) as the basis of a population-based cancer surveillance system. In 1994, the National Program for Cancer Registries initiated a program to enhance the capability of registries and facilitated the establishment of national standards. The formats for all data items were brought into compliance with the guidelines of the North American Association of Central Cancer Registries.¹ The General Statutes were updated in 1999, requiring that all health care providers report cancer cases, thus giving the CCR access to more complete data.

Why Have a Central Cancer Registry?

In order to have an effective cancer registry, *all* health care providers must support the collection of necessary data. Five of the primary justifications for a CCR apply directly to medical interests.

Disease Prevention. Prevention is a complex and multifaceted issue. Primary prevention is facilitated by central cancer registries, which can identify population groups with high and low occurrence, and can identify disparities in certain aspects of cancer care and incidence between rural and urban populations, and between black and white popula-

tions. Identifying groups with high incidence allows targeted interventions aimed at reducing cancer risk. Secondary prevention relies on disease control, which requires disease surveillance. The CCR is a surveillance tool, providing information about subgroups with late stage disease and high mortality rates.² This can enhance early detection and promote access to state-of-the-art cancer care, both goals of the CCR. Tertiary prevention, long regarded as a small part of cancer prevention, is now becoming a much greater consideration. Pain management, secondary cancer risks, and quality of life are other prominent issues. Improving survival rate for cancer and the longer life expectancies of the population raise the importance of the surveillance activity of the CCR.

Medical personnel are involved at all levels of prevention, particularly secondary and tertiary. The North Carolina Central Cancer Registry actively participates in studies of the value of early detection programs, the impact of screening activities, and pain control. Doctors who work with groups like the American Cancer Society help design analyses and evaluations of specific aspects of secondary and tertiary cancer prevention. The flexibility to work with specific requests is one of the strengths of the CCR.

Treatment. Studies of cancer treatment are an increasingly important reason for having a CCR. Registries that participate in the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program have led national efforts in such studies. Central cancer registries can extend the data collected on cancer treatment into rural and medically under-served areas. Two examples of this in North Carolina involve describing the patterns of staging for lung cancer patients and the patterns of adjuvant treatment for colon cancer. The data show clearly, from the proportion of lung cancer cases not staged, that blacks are less likely than whites to be treated for primary lung cancer. They also show

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Table 1. Research studies in collaboration with the Central Cancer Registry

<i>Subject</i>	<i>Focus</i>	<i>Research Institution</i>	<i>Funding Source</i>
Breast cancer	Molecular epidemiology	UNC ^a	NCI ^b
	In situ, risk factors	UNC	NCI
	Managing uncertainty through nursing intervention	UNC	NCI
	Breast conserving surgery	Triad	State
	Mammography	UNC	Army, NCI
Cancer Prevention Study II	Prevention	NC Div Health Promotion	ACS ^c
Colon cancer	Treatment by stage and size of tumor	Triad	State
	Molecular epidemiology	UNC	NCI
Care			
Care-REACH	Rural health care	WFU ^d	NCI
Pathways to Care	Reasons for seeking care outside of area of residence	UNC, WFU	NCI
Patterns of Care	Geographic treatment differences	UNC, WFU	NCI
Cancer Care	Appropriateness of care	WFU	NCI
Cervix cancer	Screening utilization	NC Div Health Promotion	State
Prostate cancer	Determinants of stage at diagnosis	Duke	State, NCI
	Men under 65	Duke	NCI
	Prognosis	UNC	Dissertation
	Managing uncertainty through nursing intervention	UNC	NCI
	Molecular epidemiology	UNC	NCI
Malignant melanoma	Molecular epidemiology	UNC	NCI
Head and neck cancer	Molecular epidemiology	UNC	NCI
Agricultural health study	Environmental risk	Battelle	NCI
Ovarian cancer	Molecular epidemiology	Duke	NCI

^a University of North Carolina at Chapel Hill; ^b National Cancer Institute; ^c American Cancer Society; ^d Wake Forest University

that rural Appalachian patients with colorectal cancer are less likely to receive combination surgery and chemotherapy than patients who live in urban areas or travel to major medical centers. Two earlier studies in North Carolina compared breast-conserving treatment for stage II breast cancer in urban and rural populations, and assessed the combination of chemotherapy with surgery for colorectal cancer. Such analyses reveal the factors influencing patterns of care.

Research. Research is a major justification for a CCR (see examples in Table 1). Federally-funded research became prevalent through the 1990s and continues today. It is promoted by the presence of a population-based CCR. The state's three Comprehensive Cancer Centers and its four medical schools often collaborate with the CCR. Various medical societies use the CCR for directed research projects. In addition to studies that focus entirely on cancer among North Carolinians, the CCR also uses its data to study cohorts in which cancer is not the primary focus. An example of this type of activity is data linkage with the cohort of Love Canal (NY) residents.

Environmental Issues. Many people are concerned about cancer threats from the environment; this is one reason for the many reports of cancer clusters. A recent paper by Aldrich and Sinks describes the clinician's role in responding to reports of cancer clusters.³ Doctors can play a significant role in the recognition of bona fide, if rare, clusters such as the association of exposure to asbestos with mesothelioma and lung cancer, and vinyl chloride with liver cancer.⁴

Educating the Public. Cancer is a profound concern for everybody. The CCR staff responds to more than 1,000 requests a year from citizens seeking information about cancer risks. Many of these requests, as well as reports of perceived cancer clusters, provide opportunities for education about cancer risk. This was the driving force behind the National Cancer Registry legislation (Public Law 102-515: the National Cancer Registry Act of 1992). By monitoring cancer incidence and mortality across the state, the CCR can help educate the public and shape cancer control activities in the future.

Collaborations

The CCR has a legislative mandate to collaborate with medical researchers. Specifically, it is charged to support efforts to "lower the morbidity and mortality of cancer in North Carolina." This includes "consultation with public health work," and "rendering assistance to hospitals, health planning agencies, and research facilities." To facilitate research and disease-control efforts, the CCR makes specific provisions to assure patient privacy.

The CCR participates in a number of research and cancer control projects. These include clinical studies, university-based programs, environmental health assessments, and the investigation of cancer clusters. To facilitate these studies, the CCR has developed two specialized procedures.⁵ One is rapid reporting (expedited case finding), which strives for case identification within two weeks of diagnosis;⁶ the other is enhanced data collection and the collection of data items of special research interest. For each of these procedures, researchers have provided funding to the CCR and to participating hospital registries.

Table 1 lists examples of studies that depended on having a central cancer registry in place before an application for funding could be submitted, and those that required CCR staff for implementation. Several of them (mainly epidemiological studies) required rapid reporting of cases. The REACH Program was the first such study, but others using rapid reporting include studies of breast, colon, and ovarian cancer. Support for most of the listed projects came from federal funding sources, but many data analyses were carried out by CCR staff focusing on specific hypotheses of interest.

Studies of rural populations are especially challenging, but often reveal important information about barriers to getting state-of-the-art cancer care.⁷ Studies performed by the CCR staff have looked at pediatric cancer, survival from prostate cancer, the relationship between brain cancer and the environment, and the relation between pancreatic cancer and pesticide exposure. One study, on breast conserving surgery and adjuvant care, was carried out in collaboration with the American College of Surgeons, the American Cancer Society and the Association of North Carolina Cancer Registrars (one of the so-called TRIAD Studies⁸). Collaborative activities have expanded in the past few years to involve other southeastern states; these now address all of the components of cancer control. This year, the American Cancer Society is helping states across the nation develop data-supported cancer control plans. Such collaborative efforts serve the best interests of all partners in cancer control.⁹

The CCR works closely with the North Carolina Advi-

sory Committee for Cancer Coordination and Control. The Advisory Committee has sponsored studies of unmet cancer care needs in the state, and of cost of care. These evaluations will help guide planning of state resources for indigent cancer patient care.¹⁰

Conclusion

The Central Cancer Registry is an integral part of cancer prevention, detection and control activities in the state. During the past year, the CCR was awarded the highest level of certification from the North American Association of Central Cancer Registries for its high quality and complete data. The CCR's collaboration with researchers and its participation in public health efforts across the state make it a valuable asset in our efforts to control cancer. All health care providers have a share in the success of this program.

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"Studies of rural populations are especially challenging, but often reveal important information about barriers to getting state-of-the-art cancer care."

CME Calendar

September 22-23

Good Clinical Practices (GCPs) Course for Industry-sponsored Clinical Trials: "Preparing the Physician for Clinical Research"

Place: Quintiles Transnational Corporation, 5927 South Miami Blvd, Durham
Credit: Up to 11 hours, Category 1, AMA
Fee: \$715
Info: American Academy of Pharmaceutical Physicians Education Dept: 919/355-1000.

September 24-25

Clinical Applications of Bone Densitometry (Minifellowship)

Place: Wake Forest University Baptist Medical Center
Department of Radiology
Credit: Up to 14.5 hours, Category 1, AMA
Fee: \$850
Info: Pat Rice, Dept. of Radiologic Sciences, WFU
School of Medicine 336/716-2470 or 800/277-7654.

September 26-28

14th Annual Baby Love Conference

Place: Sheraton Greensboro Hotel at Four Seasons, Greensboro, NC
Credit: CEUs TBA
Fees: \$95 full conference; \$65 single day
Info: UNC School of Public Health: 919/966-4032; email: oce@unc.edu; online www.sph.unc.edu/oce

September 28

7th Annual George T. Wolff, MD, Primary Care Symposium

Place: Moses H. Cone Memorial Hospital, Greensboro
Credit: Up to 6 hours Category 1, AMA and AAFP Prescribed
Fee: \$50
Info: Greensboro AHEC: 336/832-8214; email: pam.reavis@mosesccone.com

October 5-6

Advances in Cardiovascular Medicine

Place: Boar's Head Inn, Charlottesville, VA
Credit: Up to 9 hours, Category 1, AMA
Fee: \$200
Info: Maria Gilson Siström, U. Virginia Office of CME: 804/924-8581 or mgs2p@virginia.edu

October 10

2nd Annual Symposium on HIV-Host Interactions in HIV Pathogenesis

Place: Searle Center, Duke Medical Center, Durham
Credit: Up to 6 hours, Category 1, AMA
Fees: \$150; \$75 CFAR members; \$50 students/fellows
Info: Louise L. Bynum, PhD, Duke Office of CME: 800/222-9984 or bynum006@mc.duke.edu

October 13-14

28th Postgraduate Course; The Alexander Spock Symposium

Place: Searle Center for CME, Duke University Medical Center, Durham, NC
Credit: 11 hours, Category 1 AMA
Fees: MDs: \$150 both days (\$100 Sat, \$50 Sun); others: \$90; trainees or emeritus: no charge
Info: Joseph Marc Majure, MD 919/684-2289

October 24-26

Recent Advances in Clinical Medicine

Place: Omni Hotel, Charlottesville, VA
Credit: Up to 18.25 hours, Category 1, AMA
Fee: \$475
Info: Camilla Turnage, U. Virginia Office of CME: 434/243-5703; email: cmt4j@virginia.edu.
Online: cmevillage.com

October 26-28

22nd Annual Mountain Medical Meeting

Place: The Grove Park Inn, Asheville
Credit: Up to 12.75 hours, Category 1, AMA
Fee: \$275
Info: Call Wake Forest University Office of CME: 336/716-4450 or 800/277-7654.

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CME Calendar, cont'd.

November 10

Hampton Roads Fall Cancer Conference

Place: The Cavalier Hotel, Virginia Beach, VA
Credit: Up to 7.25 hours, Category 1, AMA
Fee: \$35
Info: Duke Oology Consortium: 919/419-5500

November 17

Lung Cancer: Maximizing Technology and Therapy in the New Millenium

Place: Jordan Hall, U. Virginia, Charlottesville, VA
Credit: 5.75 hours, Category 1, AMA
Fee: \$50 MDs; \$35 others
Info: Camilla Turnage, U. Virginia Office of CME: 434/243-5703; email: cmt4j@virginia.edu.
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Index to Advertisers

CARE	272	Physician Solutions	242
Cycle of Hope	251	Ponce Moody	197
Compusystems	back cover	Sandhills Medical Associates	259
First Citizens Bank	inside front cover	SkyDesk	307
Heather Cook	259	St. Paul Medical	242
Make-a-Wish Foundation	303	Wake Forest University CME	245
Nextel	inside back cover	Wake Radiology	inside back cover

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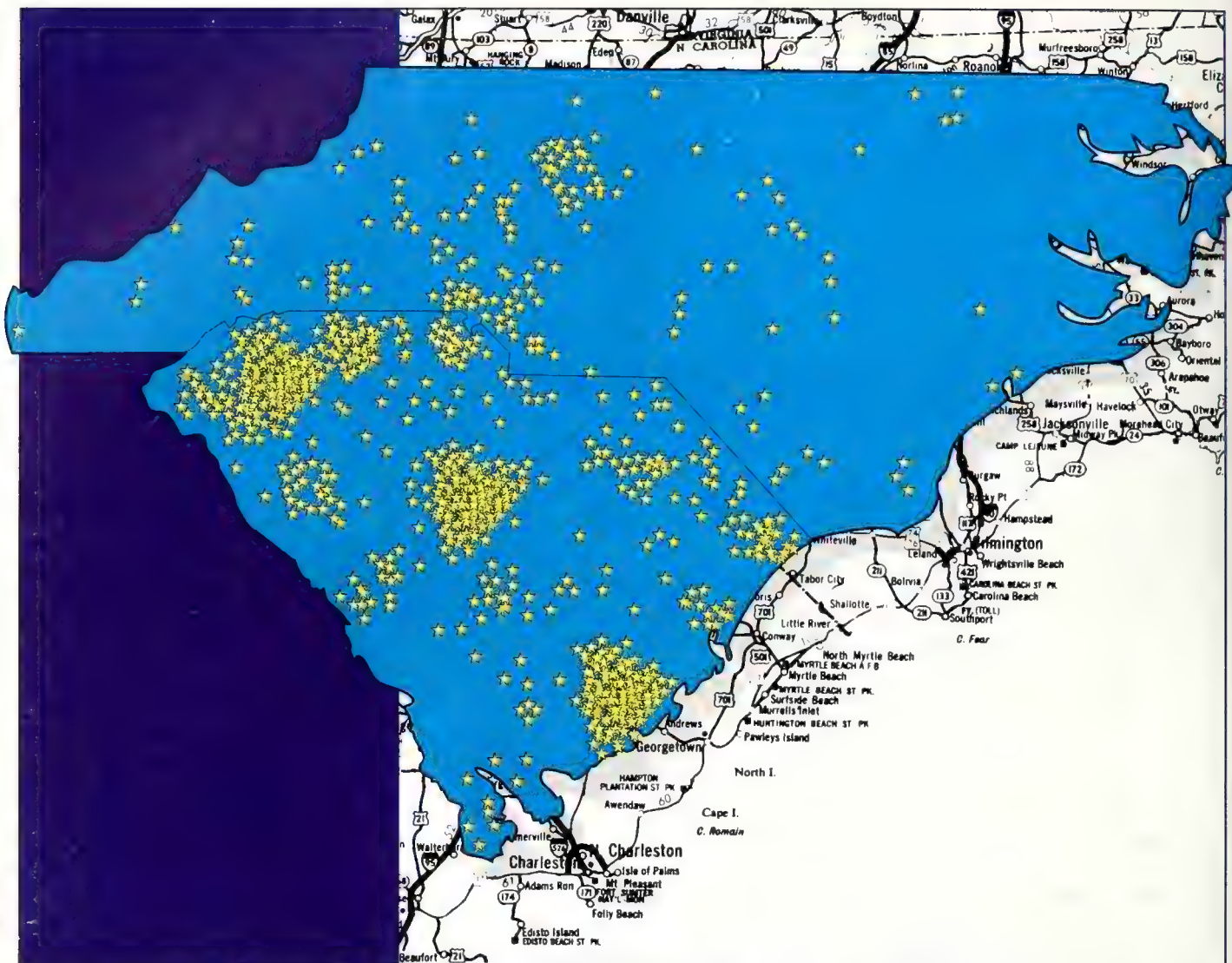
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The Future of the North Carolina Medical Journal: To Be Determined

Those who have followed the recent fortunes of the *Journal* will be saddened but not shocked to learn that the dwindling funds on which we have operated have now just about reached their end. The decision was made two years ago, at the Society's annual meeting, to suspend the Society's direct financial support of the *Journal*. Since that time, we have continued to publish because of the great generosity of friends, colleagues, foundations, and Society members who, like us, have been steadfast in their conviction that the *Journal* is the voice of something precious and irreplaceable. The *Journal* has chronicled not only the way medicine is (and has been) practiced in North Carolina but how doctors and other interested observers perceive and feel about medicine.

Many readers have told us, in person and by letter, how much they have valued this *Journal*. A number of contributors have said that they appreciated the direct and personal feedback from colleagues who have read their articles; many have had more feedback about the papers they published in the *Journal* than about any others they have written. It is precisely this sense of immediacy and relevance and shared experience that makes the *Journal* unique.

These supporters have sustained us over the past two years with their contributions—and, not negligibly, with their stalwart optimism. At the present time, we have sufficient funds to publish at least one issue of Volume 63. After that appears, we will have to cease publication, barring a new source of financial support. The good news is that the North Carolina Institute of Medicine has approached us about assuming publication of the *Journal*. This arrangement could be mutually beneficial, although it will necessarily entail some changes in the organization and editorial direction of the *Journal*. There are still many uncertainties about this prospect, to be sure, but we are heartened by the Institute's interest. As is so often the case, everything hinges on whether the Institute can gather sufficient funds. It is still too early, as we go to press, to know whether they will be successful, but we remain hopeful that we'll see you here again—and for the foreseeable future.

Francis A. Neelon, MD
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For Doctors and Their Patients

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EDITORIALS

- 317 The Future of the North Carolina Medical Journal: To Be Determined *Francis A. Neelon, MD*
- 326 A New Way of Making Doctors: Distance Learning for Non-Traditional Students *Eugene A. Stead, Jr., MD*

SPECIAL ISSUE: Traumatic Brain Injury

- 328 Traumatic Brain Injury: North Carolina's Challenge
C. Gregory Smith MD, MPH, Philip E. Veenhuis MD, MPH, Robert E. Meyer, PhD
- 336 Traumatic Brain Injury: State of the State *Stephen R. Hooper, PhD, Beth Callahan, CBIS*
- 340 Shaken Baby Syndrome: Lethal Inflicted Traumatic Brain Injury in Young Children
Heather Keenan, MDCM, MPH, Desmond K. Runyan, MD, DrPH
- 344 Primary Care for Children with Brain Injury *Joshua Alexander, MD, Daniel Moore, MD*
- 350 Training School Psychologists in Traumatic Brain Injury: The North Carolina Model
Stephen R. Hooper, PhD, N. William Walker, EdD, Cynthia Howard, PhD
- 355 Recreation Therapy Can Help Adult Brain Injury Survivors Get Back into the Community
Jan S. Hodges, PhD, Karen Luken, MSRA, and Betsey Zook, MA
- 359 North Carolina's TBI Project ACCESS: Assuring Coordinated Care, Education, and Support for Survivors of Pediatric Brain Injury
Joshua Alexander, MD, Beth Callahan, CBIS, Anne King, BA, Jennifer King, MSW, Stephen Hooper, PhD, Sheri Bartel, MEd
- 364 To Fall or Not to Fall: Brain Injury in the Elderly
Howell C. Sasser, PhD, Flora M. Hammond, MD, Amy E. Lincourt, PhD
- 368 Sports Related Head and Brain Trauma *Frederick O. Mueller, PhD*
- 373 What Can We Do About Long-Term Sequelae of Traumatic Brain Injury? *Randall W. Evans, PhD, ABPP*
- 376 The Costs of Traumatic Brain Injury *Karla Thompson, PhD, Al Antony, MD, Adam Holtzman, MStat*

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- | | |
|---------------------------|--------------------------|
| 321 Letters to the Editor | 382 CME Calendar |
| 349 Running the Numbers | 384 Indexes to Volume 62 |
| 381 Classified Ads | 388 Speaking of Medicine |
| | 388 Index to Advertisers |



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Letters to the Editor

Bioterrorism Redux

To the Editor:

Over the past year the North Carolina Department of Health and Human Services has been developing its bioterrorism response plan as part of a larger state emergency response plan for a bioterrorism event. As part of this effort, the Division of Public Health is assembling a packet of informational materials for distribution to local health departments and related organizations. We would like to include in each packet a copy of the article Bioterrorism: A New Threat with Psychological and Social Sequelae, authored by Drs. Smith, Veenhuis, and MacCormack of this department, [NC Med J 2000;61:150-63]. We anticipate reproducing and distributing at least 150 copies of this article.

J. Steven Cline, DDS, MPH
Chief, Epidemiology Section
Division of Public Health, NC-DHHS
1902 Mail Service Center
Raleigh, NC 27699-0195

To the Editor:

I am an emergency physician in Hendersonville, NC. After the recent events in New York and Washington, I reread your article on Bioterrorism from last year [Smith et al. NC Med J 2000;61:150-64]. I found the sections on Adverse Mental Health Effects - ASD and PTSD and Other Stress-Associated Sequelae, as well as the discussion and summary, to have valuable information applicable to the current situation. Unfortunately, when I tried to access the additional references online, the issue was no longer available.

My current interest is in the stress related sequelae experienced by caregivers, especially physicians, both in the recent disasters and for the future. I plan to attend a table top exercise our LEPC is holding soon on Bioterrorism and feel physicians should be more involved in disaster preparedness.

I have found, in my brief three years now practicing in North Carolina, that the *North Carolina Medical Journal* has value on a broad range of issues affecting North Carolina physicians. It is a forum for current clinical science and practice, medical history, social issues and others. For example, I was pleased to

send a copy of the article on Chang and Eng Bunker [NC Med J 2001;62:66-8] written by Eban Alexander, Jr. MD, to Martin Samuels, MD, at the Brigham. Marty had discussed an interest in this topic with me in Philadelphia. Later he wrote me that he would share the article with Dr. Alexander's son, a neurosurgeon in Boston.

Charles Henrichs, MD, FACEP
Margaret R. Pardee Memorial Hospital
715 Fleming Street
Hendersonville, NC 28791

From the Editor:

The article on bioterrorism has assumed, unfortunately, a new degree of timeliness. Because of the number of requests we have received in the last few weeks, we have re-posted it to our web page as a PDF file, available for down-loading.

The Biopsychosocial versus the Supernatural, and Other Matters

To the Editor:

I am fascinated by John Ewing's intellectual conflicts about "the supernatural," which we ought not to be required to believe in, and the "biopsychosocial model" that he considers indispensable [NC Med J 2001;62:243-4. Letter]. May I suggest that "the supernatural" is and always has been our explanation for those things we don't yet understand. John Ewing recognizes that there must be some physicians who do not understand the "biopsychosocial model." For them, even that is "supernatural."

Not everyone means the same thing by the word "soul," but I think Dr. Ewing may be less conflicted if he thinks of it as our biopsychosocial connection with those powers of the Universe, those waves of energy, that we are not yet able to measure on our oscilloscopes. If we have learned anything from the history of science, we have learned that there are most likely new connections that we will be understand how to make tomorrow. And our only way to connect to those unseeables is "prayer." As we have new eyes to see with, our prayer will connect to a different set of unseeables.

I'm so glad that you also remembered Joann Burkholder [NC Med J 2001;62:243. Letter]. She certainly suffered

enough from estuary associated syndrome and worked hard enough on understanding it to deserve to be remembered. And thank you to Dr. Shah for making sense out of gastric-oral transmission for H-pylori.

John R. Dykers, Jr., MD
PO Box 565
Siler City, NC 27344

From a Clinical Outpost


To the Editor:

I am the Librarian at the Institute of Child Health situated at the Red Cross War Memorial Children's Hospital in Cape Town, South Africa. Our hospital is the only one dedicated to pediatrics south of the Sahara, and we never turn anyone away.

We are currently building our Poisons data base (we run a 24-hour hot line service) and are interested in an article from your journal about Pennyroyal and its adverse effects [Mack R. NC Med J 1997;58:456-7.] We are unable to get an abstract and wonder if you could let us have one.

Marilyn Smith
Institute of Child Health Library
ICHLIB@ich.uct.ac.za

We encourage and welcome letters from our readers. Type and double-space all text, keeping length to under 500 words. Longer letters may be considered for publication as commentaries. We reserve the right to edit and abridge all copy. Send by mail: North Carolina Medical Journal, Box 3910, DUMC, Durham, NC 27710; by fax: 919/286-9219; or by email: nash0004@mc.duke.edu.



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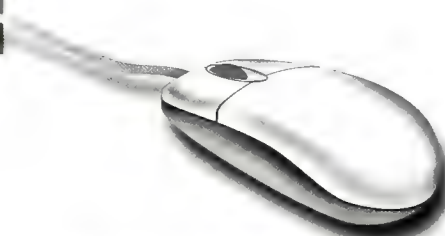
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A New Way of Making Doctors

Distance Learning for Non-Traditional Students

Eugene A. Stead, Jr., MD
Editor Emeritus

Throughout the country, colleges and universities are changing their traditional programs to meet the needs of "non-traditional" students. It is time for accredited medical schools to do the same. They should establish distance learning curricula that would allow experienced, community-bound health professionals—physician assistants (PAs) and nurse practitioners (NPs)—to take medical school courses from home or at work. This would allow us to build upon the talents of these "non-traditional" but seasoned clinical veterans. We could rapidly and relatively cheaply increase the number of practicing doctors in rural and medically underserved areas.

There will always be a need for traditional four-year, on-campus medical schools, but these programs bypass a wealth of highly qualified health professionals who have the potential to give their communities even better service. In the past, medical schools have accepted advanced-standing students based on prior knowledge and experience, and have awarded these students medical degrees whenever they were judged ready to take the medical practice qualifying examinations. About 35 years ago, before the age of space exploration, the market for PhD graduates collapsed while the market for MD graduates remained robust. A medical school in Florida decided that the first two years of a PhD program covered the science requirements for medical practice, and they began to accept PhD students into the third year class of medical school. As physician-in-chief of Duke Hospital, I appointed several of these "fast-tracked MDs" to the resident staff. They performed as well as, and in some instances better than, students who had spent four rather than two years in medical school.

What should be the admission requirements for community-bound, non-traditional students? I would suggest that the first pool of applicants be drawn from the ranks of physician

assistants and nurse practitioners who are already working in collaboration with doctors in communities of great medical need. These applicants should be at least 27 years old and have master degrees from accredited educational programs that included one year of the sciences necessary for medical practice and one year of rotating clinical clerkships applicable to work in primary care specialties and settings. Most PA and NP schools meet these requirements. Finally, the candidates should have completed at least three years of practice under the supervision of or in collaboration with an MD or group of MDs who could write support letters and serve as mentors for the students once they are accepted into the distance learning program. Before acceptance, students would commit to careers as generalist physicians and to staying and working in their home communities (or similar settings) after graduation and residency training—the bulk of which would be completed in their home communities.

Having the student remain in the practice will strengthen the bond between student and mentor as the student learns more and becomes a significant contributing partner. Living in a rural or underserved community where their families have put down roots increases the likelihood that the students will remain in the community as physicians once their education is completed. As physicians, they will be more likely to employ PAs and NPs in their own practices, and to use the team approach to delivery cost effective health care services.

What about the curriculum—how should it be organized, presented and evaluated? I would start the on-line, distance learning program with 20 students who would spend one or two weeks on the medical school campus just before starting the on-line courses. This would give the faculty a chance to meet these students in person and get a practical sense of their depth and capabilities. The dean assigned to these students would have

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the help of the traditional medical school faculty to develop a set of written and oral examinations, clinical skill problems, and other evaluation methods to determine what courses or units of learning each of these 20 students needed to be able to pass the qualifying examinations for medical practice. The curriculum would be individualized, drawn from existing material, and delivered over the Internet to the students. Both on-campus and community-based mentors would assist students in the development of necessary additional skills. If this were done appropriately, I believe these students could take both the basic sciences and clinical qualifying examinations in the same week. The performance of these nontraditional students on these examinations could be compared with the traditional four-year medical students' performance; if their pass rates were the same as or higher than those of traditional students, then the program can be declared a success. Past experience shows that older students, eager to be in school and anxious to make up for lost time, perform better than younger students do. Because of their explicit commitment, we will be assured from day one that more of these nontraditional students will practice in rural or medically underserved communities.

As founder of the Duke University Physician Assistant Program and PA movement, I am well aware of the benefits of

having a physician assistant share in my practice. As a practicing physician, I enjoyed the freedom given to me by my very capable assistant. If you need proof of the difference that the MD/PA alliance made in my professional and personal life, just ask my wife. To this day PAs are mostly recruited, educated and employed by physicians. They and their professional organizations are committed to strengthening the bonds that already exist between us. Most PAs are highly satisfied with their personal careers and don't want to be physicians. But those who are ready and willing to continue their education should be given the opportunity to do so. Especially those who are willing to continue working in primary care and in rural or other medically underserved communities. We the medical profession owe them that much. By using modern technology, and giving them credit for prior knowledge and skills, we can save them from squandering seven years of precious time, and help them meet the need of so many of our citizens for appropriate health care services.

Which medical school will be the first to take the lead? Which has the courage to explore alternative pathways to becoming a physician? Some school will step forward because it makes good sense to do so. I would enjoy hearing from any who are interested in my proposal.

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Traumatic Brain Injury

North Carolina's Challenge

C. Gregory Smith MD, MPH, Philip E. Veenhuis MD, MPH, Robert E. Meyer, PhD

Every 15 seconds someone in the United States sustains a brain injury from externally inflicted trauma. Traumatic brain injury (TBI) can be either primary (occurring at the moment of injury) or secondary (resulting from processes that complicate the injury). Primary impact injuries consist of skull fracture, epidural hemorrhage, brain contusion or laceration, and intracerebral hemorrhage; primary acceleration/deceleration injuries include subdural hemorrhage, diffuse axonal injury, and diffuse vascular injury. Secondary injury arises from hypoxia, ischemia, edema, increased intracranial pressure, or infection. TBI may lead to long-term impairment of physical, cognitive, and/or psychosocial functioning (Table 1). The neuropathology of brain injury and its forensic importance are detailed elsewhere;¹ practice guidelines and references pertinent to the clinical assessment and management of TBI may be found in additional references available from the authors, or online at www.ncmedicaljournal.com.

The Traumatic Brain Injury Act of 1996 charged the Centers for Disease Control and Prevention (CDC) with developing a uniform reporting system to determine the incidence of and risk factors for TBI. In 1998 the National Institutes of Health convened a panel to develop a consensus statement based on review of the scientific literature and expert testimony.² The panel concluded that

- ◆ TBI is a major public health problem, and often has lifelong consequences;
- ◆ The diagnosis of mild TBI is often overlooked, and early intervention neglected;
- ◆ Given its large toll and absence of a cure, preventing TBI is of paramount importance;
- ◆ Identification of, intervention with, and prevention of alcohol abuse and violence can reduce the incidence of TBI, and its effects;

◆ Rehabilitation services are required to optimize the outcome of TBI;

◆ Family members and significant others should be involved in the rehabilitation process;

◆ Adequate funding is needed to meet acute and long-term needs.

Last year Congress reauthorized the act for another 5 years and appropriated \$6 million so that the CDC could expand state surveillance, educational, and prevention activities.

Each year some 1.5 to 2 million Americans incur a TBI. Of these, 50,000 die, 230,000 are hospitalized and survive (80,000 of whom are disabled), and an estimated 1 million are treated and released from hospital emergency departments. Many thousands of undocumented cases are evaluated and discharged from urgent care clinics, and untold others go entirely undiagnosed. Motor vehicle, bicycle and pedestrian/vehicle accidents account for 50% of cases, violence for 20%, and falls (especially in the elderly) and sports-related injuries for most of the rest.³⁻⁷ Sports, particularly football, wrestling, boxing, horse-back riding, ice hockey, skiing, snowboarding and sledding, and most other competitive sports, carry a risk of acute TBI. Recreational novelties and fads like skateboards and scooters are risky, and some neurologists are concerned that the high speeds and gravitational forces generated by gargantuan roller coasters pose a risk of TBI to unsuspecting riders.

Chronic TBI (CTBI) has been studied extensively in boxers. The number of bouts fought correlates strongly with the severity of chronic encephalopathy. It manifests as varying degrees of impairment, the most severe of which is known as *dementia pugilistica*, but there may be motor abnormalities (tremor, dysarthria, or parkinsonism); cognitive changes (mental slowing and memory deficits); or psychiatric disorders (explosive behavior, morbid jealousy, pathological intoxication, and para-

Dr. Smith is a medical epidemiologist in the Division of Public Health, NC Department of Health and Human Services. Dr. Veenhuis is Medical Director, Division of Mental Health, Substance Abuse and Developmental Disabilities, NC Department of Health and Human Services. Dr. Meyer is an epidemiologist in the State Center for Health Statistics, North Carolina Department of Health and Human Services.

noia). CTBI shares many of the pathological characteristics of Alzheimer's disease, and recent studies have implicated soccer as a cause of chronic TBI and neurocognitive impairment.⁸⁻⁹ We need more research to define the time to onset and the severity of central nervous system effects that may result from repetitive head injury in athletes.

In 15 states (Alaska, Arkansas, Arizona, California, Colorado, Louisiana, Maryland, Minnesota, Missouri, Nebraska, New York, Oklahoma, Rhode Island, South Carolina, Utah) the CDC supports standardized collection of surveillance data related to TBI.¹⁰ Not surprisingly, the data indicate two peaks of incidence, one in individuals aged 15-24 years, and another in those 75 and older. The risk for men is twice that for women, and the risk for young adult minority urban men is especially high.⁴ Motor vehicle crashes cause the most injuries, but firearms are the leading cause of death from TBI. In 1992, guns caused 44% of TBI deaths (motor vehicles caused 34% and falls 9%).³⁻⁵ It is especially disturbing that TBI is the leading cause of death and long-term disability in children and young adults; more than a million children suffer TBI each year and over 30,000 are disabled for life as a result.^{6,7} The most tragic cases are those resulting from negligence (like failure to use child restraints in motor vehicles), and violence (shaken infant syndrome, child abuse, use of firearms) by parents, relatives, caregivers, and others. And thousands of children who otherwise would be alive and normal are dead or permanently-brain injured simply because they did not wear a bicycle helmet.

An estimated 5.3 million Americans live with a TBI-related disability, meaning that society incurs an enormous financial cost—some \$48 billion annually, of which \$9 to \$10 billion is spent on acute care and rehabilitation.^{5,6,11} The accompanying dramatic changes in life-course, profound disruption of the family, enormous loss of income and earning potential, and costly medical expenses often overwhelm victims and family members who are thrust into the role of long-term care providers without adequate financial support from insurance or governmental sources.¹² Physical impairment is the most readily obvious effect of TBI, but the less obvious problems with thinking, emotional, and behavioral function are often more problematic, because they affect interpersonal relationships, school and work.^{6,7} In fact, so many of the resultant disabilities are hidden that TBI has been called an invisible epidemic.¹³

There is some good news. Rates of hospitalization for TBI have declined 50% since 1980, along with TBI-related death

Table 1. Potential sequelae of traumatic brain injury

Headache	Depression	Personality change
Fatigue	Aggression	Behavioral change
Impaired memory	Anxiety	Cranial nerve deficit
Impaired concentration	Irritability	Motor deficit
Impaired attention	Sleep disturbance	Sensory deficit
Impaired information processing	Sexual dysfunction	Hypopituitarism
Seizure disorder	Unemployment	Family stress/Dysfunction
Substance abuse	School dropout	Suicide
Criminal behavior	Medical disability	

rates.^{3,5} These decreases are partly attributable to prevention-oriented educational campaigns; to laws requiring use of seat belts and child safety seats, and use of helmets by bicyclists and motorcyclists; to changes in athletic rules involving bodily contact; and to use of better helmets and head gear to protect participants in TBI-prone sports. The dramatic decline in hospitalization rates suggests that an increasing proportion of persons with mild to moderate TBI are being treated and released rather than being admitted for observation and treatment. The decrease in mortality is attributable to improvements in emergency care, to safer and more rapid transportation to specialized treatment centers, and to advances in acute medical management, especially management of the factors that result in secondary injury.^{6,7}

The downside of decreased mortality from TBI is that there are more survivors with impaired physical, cognitive, and psychosocial functioning. To minimize disability, TBI survivors often need integrated rehabilitation by professionals trained in rehabilitation medicine, psychiatry, and special education. Educating parents and teachers about the sequelae of TBI and developing individualized education plans for students with TBI can minimize TBI-induced learning disability. Impaired psychosocial functioning is particularly difficult to treat because of the complex relationship between the physical and cognitive effects of TBI and any abnormal psychosocial functioning that predated the injury. The possible linkage of TBI with post-injury substance abuse, criminality and psychiatric disability is especially complicated.

Pre-existing antisocial behavior and use of intoxicating substances (both chronic use and use immediately before the trauma) increase the risk of TBI and diminish the likelihood of successful physical, cognitive and psychological rehabilitation. Rimel et al (cited in 14) found that 78% of patients with moderate TBI had positive blood alcohol levels; 34% of moderately injured and 10% of mildly injured persons had abused alcohol before injury. A prospective study of 918 consecutive hospital admissions for TBI found that 62% of men and 27% of women had positive blood alcohol levels.¹⁴

It has been postulated that TBI increases the risk of subsequent substance abuse and criminality. Young men, who

have the highest incidence of TBI, also have the highest rates of substance abuse and arrest. About 20% of these individuals are moderate drinkers, and another 20% are heavy drinkers. Kreutzer et al, evaluating 74 unemployed persons with TBI referred for vocational services, found that 66% had been moderate or heavy drinkers and that 36% had used illicit drugs (marijuana, cocaine, and amphetamines) *before* their injury. Post-injury statistics are also troubling; 50% of the subjects abstained from alcohol after TBI, but 28% remained moderate or heavy drinkers. Hall (cited in 14) found that 32% of his studied patients were alcohol-dependent and 20% were drug-dependent two years after injury.¹⁴ These findings indicate the need for substance abuse education and prevention programs in the care of TBI patients.

Post-traumatic personality change, thought to be related to damage to the frontal or temporal lobes, is relatively common and persistent after TBI. There have been several surveys of relatives and caretakers to evaluate the incidence and characteristics of aggressive behavior following TBI. Clum and Ryan (cited in 14) found that 53% of patients were irritable, 50% had temper outbursts, and 47% had decreased self control. Nearly one fourth of spouses said that they had been verbally abused or threatened with physical violence. In a longitudinal study, Hall found that 35% of caretakers reported a moderate to severe problem with aggressiveness two years after TBI. In a separate, five-year study of 42 severely injured patients (Brooks et al, cited in 14), relatives described 64% of them as irritable and having a bad temper; threats of violence increased from 15% at 1 year to 54% at 5 years after TBI; at 5 years, 20% of relatives had been assaulted at least once and 31% of patients had been in trouble with the law at least once.¹⁴

Compared to the general population, those with TBI are four times more likely to be arrested. Kreutzer et al found 20% of 74 TBI patients referred for employment services had been arrested before they were injured and 10% after. The most frequently reported crimes involved driving while intoxicated, public drunkenness, disorderly conduct and drug abuse violations. Several had been arrested for battery, assault, and breaking and entering. Hall found that 16% of 71 persons had been arrested for non-traffic violations, and 8% incarcerated *before* their TBI; two years later, 24% had been arrested and 18% had been jailed. In a longitudinal study of 347 mixed-severity TBI patients, Kreutzer et al found that 20% had been arrested before injury and 7%, after. Once again, most of the arrests were alcohol- and drug-related. Of those who had been arrested before their injury, 81% were moderate to heavy drinkers, 6% were infrequent or light drinkers, and 13% were abstinent; but among those who had not been arrested before their injury, 47% were moderate to heavy drinkers, 27% were infrequent to light drinkers and 24% were abstinent. After the injury, 58% of the arrested group were classified as moderate to heavy drinkers and 38% were abstinent compared to 27% and 55% in the non-arrested group.¹⁴

Few studies have looked at the relationship between

violent crime and brain injury. Harrison-Felix et al found that those who were injured by violence tended to be nonwhite, unmarried men with little education, living alone and unemployed at the time of the injury. Survivors of violent and non-violent TBI had similar functional outcomes, but they differed, both before and after injury, in socioeconomic characteristics, severity of injury, and eventual integration into the community.¹⁵ Some have suggested that organic brain damage may predispose to commission of a violent crime. Lewis et al found that 15 of 15 death row patients had histories of severe head injury.¹⁶ Other studies provide evidence of a strong association between substance abuse and criminal behavior. Surveys of convicted criminals in the US have found that most were under the influence of alcohol while committing crimes, including murder, assault, rape and burglary. Compared to those never arrested, TBI patients with a history of prior arrest are at greater risk of substance abuse after injury. Those patients should be identified early so that appropriate educational and preventive programs can be started.¹⁴

North Carolina Perspective

North Carolina has no population-based TBI registry and no ongoing TBI surveillance effort, but mortality statistics and hospital discharge data provide some insight into the magnitude of the problem here. The annual TBI-related death rate for North Carolina during 1996-1998 was 22.9 per 100,000 population, which was lower than the national average (20.1/100,000) and all other Southeastern states except Florida. Based on state injury profiles prepared by the CDC, TBI mortality data for North Carolina and the nation remained relatively stable from 1989 to 1998. However, with improved prehospital care and clinical management, one might expect mortality rates to decrease over time—unless the incidence of severe TBI is increasing. Analysis of deaths due to motor vehicle crashes, firearms, and falls (each of which contributes substantially to TBI mortality) for North Carolina shows that North Carolina exceeds the national average for deaths due to motor vehicles and firearms, possibly explaining the “stable” death rate over the years.

The economic and public health impact of TBI in North Carolina is considerable. During calendar year 2000 there were 4,862 hospital admissions (excluding emergency department or outpatient visits) for a TBI-related diagnosis. Hospital charges for these patients, exclusive of professional and medication charges, totaled more than \$118 million. The leading causes of TBI-related hospitalizations were motor vehicle accidents (40%) and falls (30%); intentional but not self-inflicted injuries accounted for 8% of admissions. Of those admitted, 65% were men; 29% were aged 65 and older (falls accounted for 66% of these admissions), and 19% were aged 15-24 (motor vehicle accidents caused the TBI in 68%) (Table 2).

Preventing TBI

Because motor vehicle accidents are the leading cause of TBI (and second leading cause of death from TBI), prevention of TBI has focused on motor vehicle safety. Crash testing conducted by manufacturers and federal safety agencies has led to design improvements, and laws have put those improvements into practice by requiring that cars have seat belts with shoulder harnesses and air bags to protect the driver and forward passenger. Because TBI is the principal cause of death in motor vehicle accidents, enforcement of laws mandating the use of seat belts and child restraints is necessary if North Carolina is to reduce TBI morbidity and mortality. One unfortunate and unanticipated result of air bag use has been the severe injury or death of some children and small adults during the rapid inflation of these devices. Warnings now focus on preventing injuries to susceptible individuals, and in some vehicles passenger air bags can be deactivated. Air bags primarily protect against head and thoracoabdominal injury from frontal impact crashes, so we still need side impact protection to reduce the severity and costs of injuries associated with lateral impact crashes.

Many states, including ours, have laws requiring motorcyclists to use helmets and those traveling by automobile to use seat belts and child restraint seats. Every dollar spent on child safety seats saves North Carolina an estimated \$32 in healthcare and other costs incurred when children are injured in a motor vehicle crash.¹⁷ The Governor's Highway Safety Program and the NC Hospital Foundation have funded the purchase of 9000 child car seats and 7200 bike helmets, distributed to indigent families by NC SAFE KIDS. Around the state, nationally certified Child Passenger Safety Instructors conduct classes on the proper installation and use of child car seats.¹⁷

Because alcohol and other drugs lead to so many motor vehicle accidents, the federal government has tied the release of federal highway funds to adoption of preventive legislation. Most states have lowered the permissible level of blood alcohol in drivers (in North Carolina it is now 0.08 mg/dL). Drivers suspected of being under the influence who refuse a Breathalyzer test automatically lose their licenses for one year. It is a violation of NC law to have an open container of an alcoholic beverage in a motor vehicle.

The UNC Highway Safety Research Center and insurance companies are important sources of data with which to develop preventive strategies. Teen-age drivers have the highest accident rates, so it is vitally important that driver education programs address the inexperience, risky driving behaviors, substance abuse, failure to use seat belts and other factors that contribute to this. North Carolina recently implemented a graduated driver's license for teenagers, requiring that they drive in the company of an adult and restricting driving hours until certain criteria are met. For individuals with medical disabilities, NC has a rigorous medical evaluation program designed to ensure that these drivers do not present unacceptable risks to themselves or others.

Table 2. TBI-related admissions of North Carolina residents in 2000

Age	No. of admissions (% of total)	Rate*
0-4	274 (6%)	50.8
5-9	142 (3%)	25.2
10-14	185 (4%)	33.6
15-24	904 (19%)	80.9
25-34	558 (12%)	46.0
35-44	626 (13%)	48.6
45-54	444 (9%)	40.9
55-64	344 (7%)	47.5
65+	1385 (29%)	142.9
Total	4862 (100%)	60.4

*cases/100,000 population

The CDC has determined that each year approximately 17,000 bicyclists are hospitalized for, and nearly 800 die of, head injuries. Helmets can reduce the risk of head injury by 85%. In 1992, the American Academy of Pediatrics developed a Model Bike Helmet Bill (revised in 2001) that outlines legislation regarding helmet use by children. The Children's Bicycle Helmet Safety Act of 1994 provided states and organizations with grants to encourage helmet use. Over the past nine years, 19 state legislatures, representing nearly 50% of the nation's children, have passed laws mandating helmet use by young bicyclists.¹⁸ This year, the North Carolina General Assembly approved a law requiring children aged 16 and under to wear a helmet. Good as these preventive first steps are, they do not go far enough. The Consumer Product Safety Commission (CPSC) found that, in 1998, persons aged 35-54 died from bicycle crash-related head injuries at twice the rate of children.¹⁹ Private, state, federal and international helmet initiatives sponsored by organizations like the Bicycle Helmet Safety Institute, the CDC, the CPSC, and the World Health Organization have increased bicycle helmet use from 18% in 1991 to 50% in 1998. Even so, the goal is still only half met. When all bicyclists wear helmets, we should see a significant decline in the incidence of TBI, particularly severe TBI.

The North Carolina Medical Examiner System and the North Carolina Child Fatality Prevention Team investigate all unexpected or injury-related child deaths so that preventive measures can be developed. Since 1985, over 400 North Carolina children have been killed by caregivers. Between 1985 and 1994, there were 259 of these homicides; in 220 cases (85%), death was due to child abuse perpetrated by one or both biological parents. Approximately 60% of the deaths were due to blunt force (often to the head), shaking, or use of firearms.²⁰ A triad of findings—subdural or subarachnoid hemorrhage,

retinal or optic nerve hemorrhages, and lack of external signs of craniofacial trauma—is highly suggestive of shaken infant syndrome.¹ Cases of shaken infant syndrome and child abuse should be investigated thoroughly by appropriate social service and law enforcement agencies to assure that those responsible do not go unpunished, and that children who survive, and their siblings, are not at future risk from the perpetrators.

Many factors underlie the increase of violence-associated TBI, particularly in older teen-agers and young adults; the problem largely reflects the interaction of inner city poverty, drug use, absence of parental supervision and community support, and ready access to handguns and other firearms. Each of these variables needs to be addressed if we are to reduce the incidence of TBI, particularly in young, urban, black males.

The large numbers of military personnel in North Carolina form a population at special risk for TBI. The Department of Defense compulsively addresses issues of safety associated with military training. There is a need for better ballistic helmets because, although the head represents only 9% of the body area exposed in combat, it receives almost 20% of the “hits.” Soldiers also must learn to control aggressive behavior, which can be helpful in combat but can increase the risk of head injury in peacetime. However, it may be hopelessly idealistic to imagine young soldiers—urged to extremes of physical prowess, and proud of it—employing “training in conflict resolution” rather than physical action to settle a dispute in the local bar.²¹

Early detection, monitoring and prevention of sports-related TBI, especially in high school and college sports, are areas of current interest and research.^{22,23} Baseline and post-injury neuropsychological assessment provide important data on neurocognitive function in athletes, and on-site mental status evaluations of those who experience head injury are very important in deciding whether or not the athletes should return to competition.^{24,25} Guidelines for the management of sports-related TBI have been developed²⁶ (also see the article by Mueller on page 368).

Finally, prevention of TBI in the elderly hinges on understanding the many factors that cause falls. Failing vision and balance, adverse effects of medications, and decreased mobility make walking and navigating obstacles such as curbs and stairs difficult for many senior citizens. Eyeglasses, canes, walkers, and aids, like highlighting curbs at crosswalks with brightly colored reflective paints, are simple, relatively inexpensive ways to lessen falls in the elderly. Other measures are discussed elsewhere in this special issue.

Neuropsychiatric Classification of TBI

Since the brain is the organ of the mind, TBI may lead to a variety of mental disorders. Depending on the region of the brain affected, there may be cognitive, behavioral, or emotional symptoms in various combinations. A number of premorbid factors play a role in determining the expression of TBI. These

include, but are not limited to, age, mental ability, and the presence or absence of psychiatric disease.²⁷ A number of post-injury factors (like loss of other organ function, loss of significant others, and the development of psychiatric disease) also affect mental function. The Fourth Edition of the American Psychiatric Association Diagnostic and Statistical Manual (DSM-IV)²⁸ uses a multi-axial system that classifies mental disorders on Axis I, mental retardation and personality disorders on Axis II, and medical conditions or injuries (including head trauma and brain injury) on Axis III. TBI may cause a variety of syndromes (delirium, dementia and amnesia) that meet Axis I criteria as clinical disorders, but the syndrome that most typifies the mental sequelae of TBI is called “Personality Change due to a General Medical Condition” in DSM IV, and it is classed on Axis I, not on Axis II as a Personality Disorder. It is characterized by affective instability, poor impulse control, outbursts of aggression or rage, and suspiciousness, and has labile, disinhibited, aggressive, apathetic and paranoid sub-types. A number of other conditions, commonly thought of as “psychiatric” disorders when they occur in the absence of brain trauma, may occur after the physical trauma of TBI.

TBI is common in young men, associated with substance (especially alcohol) abuse. There is some belief, with little supporting data, that preexisting psychiatric disorders, especially substance abuse and personality disorder with impulsiveness, may increase the risk of TBI. On the other hand, there are good data supporting TBI as a risk factor for psychiatric disease. In a recent review, Van Reekum et al²⁹ found strong support for associations with major depression, bipolar affective disorder, and the anxiety disorders (generalized anxiety disorder, panic disorder, obsessive compulsive disorder and post-traumatic stress disorder). Evidence was less compelling for substance abuse and personality disorder (not personality change) after TBI. The literature did not support the association of TBI and schizophrenia.

A strong association between TBI and some psychiatric disorders has important medicolegal and clinical implications. Insurance companies often deny coverage of psychiatric difficulties that follow TBI, arguing that those conditions reflect undiagnosed preexisting or *de novo* disorders. Still, most observers feel that post-TBI psychiatric diseases are more than mere psychological reactions to the TBI. Van Reekum et al, among others, stress that a better understanding of post-TBI-related psychiatric disorders may help to explain the pathophysiology of all psychiatric disorders.

The neurological literature has many references to “mild traumatic brain injury” (MTBI),³⁰ which produced no brain damage detectable with existing diagnostic tools, but which resulted in global dysfunction syndromes of varying severity. Patients and relatives would comment that the patient was somehow “different.” With newer imaging techniques, we can now detect evidence of brain damage that has indeed occurred. DSM-IV-TR proposes a “Postconcussional Disorder” (which closely matches MTBI), and places it in an appendix of disor-

ders for which there is not yet enough evidence to form an accepted diagnostic category. The essential feature of the syndrome is impaired cognitive functioning such as attention or memory. Included in this putative syndrome are symptoms that largely incorporate the Personality Change Disorder described above but are accompanied by other symptoms such as sleep disturbance and headache.

Where Do We Go From Here?

TBI is a major public health problem in North Carolina—and there is a huge price tag attached. Through the efforts of the NC TBI Advisory Council and a small but dedicated group of medical professionals, legislators, community leaders, and citizens (many of whom have a family member, friend or loved-one with TBI), North Carolina has made significant strides in addressing this issue. Nevertheless, North Carolina's citizens and taxpayers would benefit if we had the following:

- ◆ A TBI incidence registry to provide important epidemiological information, including the identification of North Carolina-specific risk factors, that would aid the design and implementation of cost-efficient preventive measures.

- ◆ A statewide follow-up registry, modeled after the hospital-based TBI Project ACCESS (see page 359), to minimize the adverse physical, cognitive, and psychosocial sequelae of TBI. Such a registry would provide important information for designing, implementing, and evaluating specific programs (vocational rehabilitation, school and community support for people with TBI and their families) and identifying those that are cost-effective.

- ◆ Involvement of brain injury specialists in the rehabilitation of all TBI victims. The American Academy for the Certification of Brain Injury Specialists (AACBIS) offers a national certification program. It improves the quality of care by establishing competency standards for the education and training of individuals working in brain injury rehabilitation.

- ◆ Additional research, especially at our state's medical centers, to further define the relationship between TBI and post-TBI sequelae.

- ◆ A concerted, aggressive effort to address substance abuse and its many ill effects on our society, including TBI.

- ◆ Finally, the provision to victims of TBI in North Carolina, particularly children, the best possible opportunity to learn.

We have the vision and tools to accomplish those goals. However, additional resources are needed. We especially need a concerted effort to educate North Carolina's citizens, the medical community, teachers and government leaders about the causes and consequences of TBI, and the societal and economic benefits of prevention, coordinated rehabilitation, and research.

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Appendix: Organizations and Resources for Traumatic Brain Injury

Centers for Disease Control and Prevention
www.cdc.gov/ncipc/tbi

Brain Injury Association, Inc.

www.biausa.org
105 North Alfred Street
Alexandria, VA 22314
800/444-6443
E-mail: FamilyHelpline@biausa.org

The mission of the Brain Injury Association is to create a better future through brain injury prevention, research, education and advocacy.

Brain Injury Association of North Carolina

www.bianc.net
PO Box 748
133 Fayetteville St. Mall, Suite 310
Raleigh, NC 27602
919/833-9634

NC Family Helpline

Southern Triad Ctr, Highpoint Regional Hosp.
202-C Boulevard St.
High Point, NC 27262
336/885-3307
800/377-1464

Central Piedmont Center at Charlotte Institute of Rehabilitation

330 Billingsley Rd., Suite 107
Charlotte, NC 28211
704/362-1472

National Information Center for Children and Youth with Disabilities

www.nichy.org
PO Box 1492
Washington, DC 20013
800/695-0285
E-mail: nichy@aed.org

Lash&Associates Publishing and Training, Inc

www.lapublishing.com
708 Young Forest Drive
Wake Forest, NC 27587
919/562-0015

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Lash M (1998) Resource Guide: Children and adolescents with brain injuries.

Snyder H (1998) Elvin the elephant who forgets (Picture book for children with TBI)

HDI Publishers

Houston TX
800/321-7037

DeBoskey DS (Ed) (1996) Coming home: A discharge manual for families of persons with brain injury.

Lash M et al. (1998) Signs and strategies for educating students with brain injuries. A practical guide for teachers and schools.

Savage R (1995) An educators manual: What educators need to know about students with TBI (3rd Ed.)

PLEASE NOTE:

A comprehensive bibliography of additional readings in TBI is available on the Journal's website:

www.ncmedicaljournal.com.

Traumatic Brain Injury

State of the State

Stephen R. Hooper, PhD, Beth Callahan, CBIS

In the 1980s, following passage of the Trauma Services Act of the late 1970s, selected hospitals began to be designated as trauma centers. Their primary function was to save lives, which meant that persons who had sustained traumatic brain injury (TBI) had an increased chance of surviving past the acute care period. Increased survival, however, meant increased morbidity and a greater need for long-term care. Consequently, the number of rehabilitation centers increased, from seven designated brain injury programs in the country in the early 1980s to over 700 a decade later. These centers offered multi-/interdisciplinary services; lengths of stay were quite long (months to years); insurance companies and many state Medicaid offices generally paid for their services. With growth and expansion also came regulatory oversight, which pared down the number of programs over time.

This national trend was mirrored in North Carolina. Indeed, our state has a long history of serving victims of TBI and, as illustrated by many of the articles in this issue, has provided the training and facilities to serve children, adolescents, and adults affected by TBI. With state-of-the-art biomedical procedures like MRI increasingly available even in rural areas, and with five Level I Trauma Centers, North Carolina clearly is in a position to be a national leader in the treatment of TBI. With this history in mind, we assembled a range of articles for this special issue of the *North Carolina Medical Journal* that address three major goals.

The first goal was to summarize current information about TBI-related issues across the life span. The paper by Smith et al on page 328 provides an overview of current definitional issues, epidemiological findings, and other evidenced-based aspects of TBI. Other articles look at TBI in infancy (Keenan and Runyan, page 340), in adolescence and young adulthood

(Mueller, page 368), and in the elderly (Sasser et al, page 364). Several papers address a variety of medical and rehabilitation issues ranging from acute care for children with TBI (Alexander and Moore, page 344) to post-acute services (Evans, page 373) and community integration (Hodges et al, page 355). Alexander et al (page 359) describe a model program designed to provide the beginnings of a relatively seamless system of care, Project ACCESS, for children who sustain TBI. Hooper et al (page 350) outline a training model designed to educate school-based personnel about TBI. Finally, a critical article by Thompson et al (page 376) examines the costs of TBI to individuals and to society.

A second goal was to showcase several innovative programs pertaining to TBI services and training in this state. The papers on Project ACCESS, on community integration, and on the school-based training model developed by the North Carolina Department of Public Instruction are noteworthy examples, but the evidenced-based activities described in nearly every paper highlight North Carolina's ongoing research into the various nuances of TBI.

Taken together, the topics in this issue offer a rich sampling of the wide range of efforts on behalf of TBI-affected individuals and families that are currently under way in North Carolina. However, as we move into the twenty-first century, a number of challenges remain, and the state's services still show room for improvement. Our third goal was to identify the specific areas where improvement is needed. We have made progress in this regard, but much work remains. Of the many needs that could be discussed in this article, we have chosen to focus on six: diagnostic concerns, service delivery models, family needs, support groups, prevention activities, and public policy.

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Key Issues for TBI Services

Diagnostic Concerns. Most professionals working in the field have little difficulty diagnosing moderate to severe brain injury; mild injury, on the other hand, can pose a major diagnostic challenge, particularly when the primary complaint does not involve the head (for example, in a child with an arm injury from a bicycle accident). The fact is that most TBIs are mild injuries, and an increased understanding of mild TBI and its subsequent effects would improve the medical guidance and treatment we could provide to those who sustain it. For example, sports-related injuries have been getting increased attention over the past 5–10 years. As a result, high school and college athletic trainers and coaches are better prepared to identify and deal with the effects of concussion and mild TBI. For another example, a Standardized Assessment of Concussion protocol has been developed and is now recommended for use by ambulance teams and emergency department personnel. The Office of Emergency Medical Services is revising its guidelines to accommodate the long-recognized need for an improved assessment protocol for head injuries. The state's Project ACCESS has been helpful in providing appropriate educational material to persons discharged from emergency rooms, and other hospital settings. These educational materials inform brain-injured patients and families what to do if symptoms arise, worsen, or persist. This should lessen frustration and aid in finding appropriate assistance.

Service Delivery Model. The number and quality of services available to persons with TBI have improved over the past decade. What has been lacking is recognition of appropriate community-based resources, adequate training of selected professionals in the area of TBI, and a state-wide linkage of these services. Even the sequence of services from the time of injury has been inconsistent across state communities.

Over the past five years, TBI grants from the Health Resource Services Administration (HRSA) have allowed the state to begin addressing service delivery issues. One of the key efforts has been to create a "seamless system of care" for persons following a TBI, regardless of its severity. The Division of Mental Health, Developmental Disabilities, and Substance Abuse Services, in the Department of Health and Human Services, has made some progress in meeting this challenge. Figure 1 shows a suggested flow of services from the time of injury through hospitalization to community-based services. This suggested pattern will need to be made applicable to rural and urban areas, but it should facilitate a "catalog" of services available in various regions of the state. Identifying specific services (or the lack thereof), and improving linkages between services will increase the efficiency of care for individuals and families.

Family Needs. Following TBI, family members of the victim experience a variety of responses—disbelief, shock, anger,

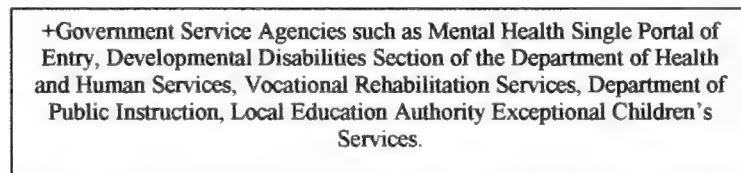
hopelessness. These feelings can be compounded by lack of empathy or knowledge on the part of medical staff, insufficient education about the nature of the injury and subsequent recovery issues, and lack of discussion of possible outcomes in the context of family needs and wants. These shortcomings can be further compounded if there is no "quarterback," a service coordinator who can provide a consistent point of contact. Unfortunately, even many professionals do not fully understand what services and agencies are available for the victims, or when and how services like social security, disability, or vocational rehabilitation should be pursued.

Attempts to make service delivery systems more responsive to individual needs still leave families of TBI survivors at risk of feeling misunderstood at each point of service. We must get better at communicating information to families, and *with* families. We must be sensitive to their emotional needs. For example, during the acute phase of recovery, some families need to be given options and recommendations about rehabilitation services, but they should still be encouraged to have a strong, decisive voice in the process. Professional awareness of resources in the community is important; all case coordinators should be well acquainted with them. But we must help families recognize and communicate their needs (which can change significantly over time). In particular, family members of a TBI survivor are at risk for medical and mental health problems of their own, and their financial burden can be considerable as well. Recognizing and supporting those family needs is important and should be part of a larger system of care for TBI.

Support Groups. A core concept of support groups is the bringing together of people with common experiences. The Brain Injury Association of North Carolina (BIANC) provides approximately 20 active support groups. In addition, several agencies, including BIANC, help individuals start their own groups. Agencies like the Family Support Network and the Exceptional Children's Assistance Center can match families of children with similar disabilities.

Despite these positive efforts, we need more circles of support in North Carolina. We can help identify natural supports (leisure activities, recreation, religion), can merge disability-specific and other support groups and activities, and can learn from the experience of groups like Arc (formerly the Association for Retarded Citizens). Doctors and other professionals need to know where these support groups are located, how to make referrals and, when feasible, should make themselves available as a resource. The state of New Jersey has begun training clergy in TBI, and these professionals have been an active part of the circle of support for families and survivors of TBI.

Prevention Activities. North Carolina has many efforts focused on TBI prevention. They include bicycle rodeos, programs to increase use of child safety restraints and seatbelts, teaching sports coaches about TBI, and recognizing Risk Watch



Communities and Headsmart Schools (schools where the TBI training curriculum has been conducted with all staff). Public policy supports these efforts by providing stricter laws about seat belt use, drunken driving, and teenage driving practices. A state law enacted on October 1, 2001, mandates the use of bicycle helmets by children 16 years old and under. The Injury Prevention Research Center (IPRC) has published a TBI Prevention Handbook (now in need of revision), which catalogs and critiques prevention programs in the state. The Governor's Highway Traffic Safety Administration has awarded grants to help three North Carolina communities develop safe communities. It is hoped that, as part of the larger initiatives, these communities will increase education about TBI and thereby lessen the frequency of injuries leading to TBI.

These prevention efforts are noteworthy, but the state clearly needs to make prevention activities better known to members of the general and professional community. A state-wide clearinghouse for ongoing prevention activities, perhaps overseen by and updated on the BIANC website, might address this need. Public health promotions about preventing TBI should also be considered.

Public Policy. Public policy is closely related to prevention efforts, especially in regard to funding. Current legislation does reflect increased sensitivity to the issue of TBI, but initiatives in prevention and service delivery have not always been financially sustained. Indeed, one could argue that TBI so increases the needs of individuals and families for services and long-term support that TBI deserves to be a line item in the state budget. The availability of state funds would lessen dependence on discretionary monies and grants, and increase the stability of the overall system of care. Members of nearly every disability group could make similar arguments, but the financial burden of treatment, management, and long-term support of brain-injured persons can be extraordinary, and some state-based support, such as Medicaid waiver, would be a big help.

The state implementation grant from HRSA has made some headway in establishing a registry of persons with TBI, but a legislatively mandated survivor registry would be better because it would document the need for services in the state's respective regions. Accurate epidemiological data would target available state-based funds to regions of the state with the most needs.

Professionals who deal with brain-injured individuals and their families need more and better training and education. Specifically, since there is only one portal of entry to mental health services in this state, it is imperative that Case Managers in Developmental Disabilities have core competency regarding TBI. The North Carolina Department of Public Instruction has an innovative model for training school psychologists; it could expand this training to include other school personnel (regular and special educators), and link to other community-based services.

It would seem important from a public policy perspective to make TBI a primary public health concern in the state. It truly is a silent epidemic, and TBI-related issues should be aggressively addressed from a public health perspective. A disability-specific focus on TBI may go against policy trends in this state and across the country, but the unique needs presented by this population across the life span argue for active consideration.

Finally, the role of the BIANC has grown over the past several years, and its role in policy making should be considered. This nonprofit organization is supported by membership fees and voluntary donations (web site: www.bianc.org). Currently, amidst an array of other activities, BIANC provides information and resources to families; helps coordinate several regional support centers; provides advocacy for TBI survivors and their families; conducts an annual state-wide conference for survivors, families, and professionals; and conducts an annual retreat and camp for survivors and families. Strengthening the linkage of BIANC to other TBI-related activities in the state will strengthen the orchestration of state public policy initiatives.

Conclusions: The State of the State

The state of North Carolina has seen significant growth in the field of traumatic brain injury. As the contents of this special issue illustrate, we have made much progress in understanding many of the issues related to TBI, and a wide variety of hospital- and community-based professionals have become aware of the issues surrounding TBI. The state has embarked on several training initiatives, and several models have been developed to increase the state's capabilities to deal with TBI. From these perspectives, the state of the state is clearly positive, and there is a dynamic vision for how services will be coordinated and implemented throughout the state and how we can increase collaboration in TBI education and training activities, sustain interest in public policy endeavors—including key legislative mandates—and improve the involvement of families in these processes. The future for survivors of TBI and their families in the state of North Carolina continues to be positive.

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Shaken Baby Syndrome

Lethal Inflicted Traumatic Brain Injury in Young Children

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The constellation of clinical findings associated with Shaken Baby Syndrome (SBS) was first described by Dr. John Caffey in 1972.¹ His report demonstrated that very young children could experience lethal or serious physical abuse from their caretakers without obvious external signs of trauma. The syndrome he described consisted of traumatic brain injury, retinal hemorrhage, and metaphyseal chip fractures at the ends of the long bones. He ascribed the injuries to severe shaking of infants by an adult caretaker. Since his original description, many subsequent reports have clarified the picture of clinical presentation, short-term prognosis, and pathology.²⁻⁶ We now know that this form of injury is predominantly inflicted on very young children, usually under two years of age (the oldest child diagnosed with this condition at UNC was 19 months old,⁷ and the oldest reported victim was a 30-year-old Palestinian prisoner⁸).

There are still many controversies about epidemiology, long-term prognosis, the biomechanics and forces needed to produce the injury, and the diagnostic specificity of retinal hemorrhages. In this paper we present a clinical overview and highlight some of the areas still requiring new knowledge.

Clinical Presentation

Shaken baby syndrome can be difficult to diagnose, requiring a clinical suspicion and a careful history and physical exam. In minimally injured infants the diagnosis can be subtle and easy to miss. Symptoms such as vomiting, fever, and irritability are common in infants, and have a variety of causes. Shaking injuries may mimic common illnesses like colic, infant feeding problems, or a mild viral illness. Clinicians may suspect meningitis in a young child with irritability and fever, but if the lumbar puncture

shows xanthochromic fluid they should be suspicious of head trauma, because xanthochromia arises from degrading red blood cells from an old intracranial injury. A traumatic tap may show red blood cells in the cerebrospinal fluid but not xanthochromia.

At Children's Hospital in Denver, Colorado, a retrospective review of the charts of 173 young children (under three years old) with head injury caused by abuse found that the diagnosis was initially missed in 54 cases (31%). Missed diagnosis was more likely in younger children, white children, and children from two-parent homes. Five of the misdiagnosed children died, and the authors estimate that in four cases death might have been prevented by earlier recognition.⁹ In this case series, children with missed injuries had often been seen more than once for the same complaints.

The key diagnostic feature of SBS is the presence of intracranial injury in a young infant. The most common injury is a subdural hematoma, but epidural hematoma, subarachnoid bleeding, or shearing injury of the brain parenchyma all occur. Diffuse brain injuries (diffuse axonal injury, tissue-tear hemorrhages, and concussion) seen in young children after shaking are thought to be a direct result of cranial accelerations of long duration and low magnitude. Children with shaking injury typically show lethargy, irritability, impaired consciousness, seizures, or apnea. Epidural hemorrhage in infants is less likely to be caused by shaking and more likely to be due to a blow or fall.¹⁰

As originally noted by Caffey, and confirmed in many other studies, retinal hemorrhages occur in 65-95% of patients. It is necessary to dilate the pupils with mydriatic agents and use direct ophthalmoscopy before excluding the presence of retinal hemorrhages, which may be unilateral or bilateral. In their analysis of missed diagnosis of abusive head trauma, Jenny et al found that 66% of the children had retinal hemorrhages.⁹ It is still mildly controversial whether retinal hemorrhages are "pathognomonic" of shaken baby syndrome, but there is widespread agreement that large retinal hemorrhages are unusual in other forms of cerebral trauma (1% of children with serious accidental head injury) or after cardiopulmonary resuscitation.

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As recently stated by Levin, a "pattern of multiple hemorrhages distributed throughout the retina, to the *ora serrata*, should not be expected as a result of any of the alternate circumstances [suggested]. Such a picture is virtually pathognomonic of SBS in the absence of another viable explanation."¹¹

Fractured bones are part of SBS in about 50% of infants, metaphyseal chip fractures (fractures at the growth plates of long bones) being the most common. Careful pathological studies have demonstrated that fractures originally thought to be avulsions of the periosteal tendon insertion are actually planar fractures through the metaphysis, which veer away from the growth plate and undercut a fragment of bone. Thus, the radiographic picture is of a "chip," but this actually represents displacement of a disk-like fragment of calcified subepiphyseal cartilage.¹² Other fractures do occur, particularly posterior rib fractures near the costovertebral articulation. In children, rib fractures are rare after unintentional trauma, and do not occur with cardiopulmonary resuscitation. Most rib fractures are the result of violent shaking rather than impact. Finally, hyperflexion can cause inflicted spinal fractures in the lower thoracic and upper lumbar vertebrae.

North Carolina's universal reporting law requires precise documentation of all findings in cases of suspected inflicted head injury, and referral to the Department of Social Services. Referral to a child abuse expert can be very helpful. It is important for the safety of other children living in the household that Child Protective Services be notified promptly.

Mechanisms and Timing of Injury

We still do not know many basic facts about shaken infants, including the exact magnitude of force necessary to produce injury.¹³ The medical consensus is that the forces must be large, and that short, simple falls or brief, mild repetitive movements do not cause these types of injuries. The biomechanics of injury depend on the characteristics of the child and the types of force applied. Infants' heads are large in proportion to their bodies, and the neck muscles are not well developed; thus, severe shaking can cause an acceleration-deceleration injury. This sets the brain in motion within the skull and dura, and the motion of the tissues differs according to density. Rotational forces and differential movement of the brain and surrounding skull can tear bridging vessels, leading to subdural hematomas. Some investigators have documented epidural hemorrhage along the cervical spine. There are strains on the axons throughout the brain, leading to diffuse axonal injury and deep parenchymal hemorrhages best demonstrated by magnetic resonance imaging.

The biomechanical model of injury is disputed by some investigators who feel that the infant's head must impact a surface to generate force sufficient to cause injury.⁴ This has brought the terminology of "shaken-impact syndrome" into the literature. Both mechanisms seem likely, but there are enough

reports of isolated shaking without impact, and enough investigation of the biomechanics, to demonstrate that a subdural hematoma can result from either sudden stoppage of a rotating head when a child is thrown onto a bed at the conclusion of shaking or from hitting the head against another surface.¹⁴ Children who have external signs of abuse may have been shaken, but they fall into the category of battered child syndrome.

There is controversy about whether falls of short distance can be fatal or produce significant subdural hematomas. It is very common for children to fall short distances, and a number of studies have shown that severe injury is very unlikely (federal data suggest an annual death rate of 0.36 per 100,000 children¹⁵). In a draft publication, Spivack could find only one case of subdural hematoma and no deaths in 842 children reported to have fallen from a bed or similar short distances. There were no subdural hematomas and no deaths in 368 instances of short falls witnessed in hospitals or other locations. Chadwick reported that only 1% of children died after falls from second and third story windows in San Diego; this contrasts sharply with the deaths of 7% of children whose parents brought them to an emergency room after a reported "fall" from a couch or bed.¹⁶

The onset of symptoms of head injury is useful both in understanding prognosis as well as establishing cause. Timing is best established by combining the history, the clinical course, and the results of imaging studies. The clinical history, if accurate, is the most precise. Elapsed time can be estimated from the breakdown of intracranial hemoglobin as captured by computed tomographic or magnetic resonance scans, but these estimates are not precise. Dating of fractures can be helpful, but it is difficult to date metaphyseal avulsion or skull fractures. Gilliland demonstrated onset of symptoms within 24 hours in 80% of shaking injuries.⁶ However, she didn't address the time of onset within the 24-hour period. She did note that "In all cases in which the children were seen by an independent observer after injury, they were described as not normal." The consensus is that the onset of symptoms after a shaking injury is virtually immediate and certainly occurs in less than 4 hours.

Prognosis

The prognosis for children with inflicted brain injury is uncertain, in part because there are few studies of such children. However, findings from studies of young children with other kinds of traumatic brain injury are worrisome. It used to be thought that the plasticity of infants' brains would allow better recovery from injury than is the case with older children. Recent work, however, shows that children injured early in the course of development are less likely to acquire appropriate skills than are children injured later in development.¹⁷ Because abusive head trauma usually occurs in very young children, their outlook may be worse. Some researchers have found that children who are severely brain-injured before they are six years old do not

catch up with their peers and have a lower rate of acquiring new skills.¹⁸ One study found that 45% of children with inflicted traumatic brain injury fell within the impaired range on cognitive tests, compared to only 5% of children with other types of brain injury (motor scores were similar for both groups).¹⁹ A retrospective study of 14 children examined approximately nine years after injury found that seven children were severely disabled or vegetative, two were moderately disabled, and five had a good outcome.²⁰

Epidemiology

The epidemiology of shaken baby syndrome is unknown, but active research efforts across North Carolina are seeking to elucidate the incidence and risk factors for SBS. We do know the following: (1) Physical abuse is the leading cause of serious head injury in young children.²¹ (2) Most SBS occurs in children less than two years of age. (3) A study at UNC found that 33% of shaken babies died from their injuries, and most of the surviving children had significant neurologic impairment.⁷

Risk factors that predispose children to abusive head injury are not certain. Some investigators have suggested that children of young parents, children in families with unstable social situations or of lower socioeconomic status, children with disabilities, and premature babies may be at special risk.^{22,23} Men outnumber women as perpetrators of shaking by a 2:1 ratio. In one series of 127 cases, 60% of the perpetrators of abuse were fathers, step-fathers, or mother's boyfriends; in 17% of cases they were female baby-sitters, and in 13%, mothers.²⁴ One study suggests that military families are at three times the risk of other families, probably because these are young families under significant financial and social stress and isolated from their other relatives.

Prevention

Efforts to prevent shaken baby syndrome have largely focused on education. A study in 1992 showed that 25-50% of parents did not know that shaking could harm or kill an infant. Programs like "Don't Shake the Baby" provide a packet of information for parents, including information about strategies to manage infant crying.²⁵ Public Service Announcements on broadcast media aim to reach a wider audience and those who cannot read. Recently, a program in New York has asked parents to view a video depicting the consequences of shaking injuries, and then sign an affidavit stating that they understand the risks of shaking. Some authorities have suggested a nationwide home visitation program to prevent shaking injuries.

It is hard to assess whether these programs are effective in preventing shaking injuries because it is difficult to make comparisons when we have no baseline data on the number of

injuries that occur each year. However, as part of routine anticipatory guidance, health care providers of primary care to children should ask parents about stress, and about how they respond to a crying infant, and then educate them on the dangers of shaking an infant. Parents should be advised to educate others who take care of their children.

Conclusion

Shaken baby syndrome is a leading cause of death due to injury in infants. Its presentation may be subtle and easily mistaken for other illnesses. Clinicians who care for young children must keep the diagnosis in mind when reported trauma does not match an injury, or when an infant repeatedly presents with symptoms of head injury. More research is needed on the epidemiology and outcomes of shaking injuries, so that preventive measures can be directed at the populations most at risk.

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HIP – Half of those who fracture never walk independently again.



SPINE – Causes posture change, height loss, and often chronic pain.



WRIST – Interrupts activities of daily living and causes pain.



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Primary Care for Children with Brain Injury

Joshua Alexander, MD, Daniel Moore, MD

Each year in the United States, more than one million children and adolescents sustain brain injuries; 100,000–200,000 of them are hospitalized, and more than 30,000 are permanently disabled by their injuries.¹ From the moment of occurrence, traumatic brain injury (TBI) transforms the victims' (and their family's) lives forever, bringing a host of new stressors, challenges and needs. As an integral part of the health care team caring for these children and their families, health care providers need to be familiar with the special needs of these patients. In this article we offer an overview for the office-based primary care provider. It reviews common risk factors, provides guidelines for estimating the extent of injury, lists common secondary conditions, and offers recommendations for the care of children with traumatic brain injury.

Risk Factors and Etiology

Twice as many boys as girls sustain brain injuries,² and persons of lower socioeconomic status are at increased risk. An unusually high percentage of children who sustain TBI have a prior history of behavioral problems like attention deficit disorder.³

The most common cause of TBI in children varies according to age. Children under five years of age are most often victims of falls; children aged 5–14 are most likely to be brain-injured as passengers in a motor vehicle crash. Motor vehicle crashes are also the leading cause of brain injuries and death in 15- to 20-year-olds, usually with the victims as drivers of the vehicles.⁴

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Estimating the Extent of Injury

The severity of a child's brain injury may be estimated from the initial score on the Glasgow Coma Scale, the presence (and duration) of post-traumatic amnesia, and the presence (and duration) of coma. First introduced in 1974,⁵ the Glasgow Coma Scale (GCS) uses eye opening, verbal response, and muscle movements to determine an injured person's level of consciousness. It has become the standard way of assessing brain injury, and although initially developed for adults, a modified version is used for infants and young children⁶ (see Table 1). Several terms need definition.

Post-traumatic amnesia (PTA) occurs when a child cannot reliably, consistently, and accurately remember events. Amnesia can be measured in children older than 4 years of age with the Children's Orientation and Amnesia Test (COAT),⁷ an age-adjusted test which can be administered in less than five minutes and repeated to monitor changes.

Coma is defined as a state of unconsciousness from which a child cannot be awakened, and during which there are no voluntary activities. Its duration may be defined as the length of time from onset until the child begins to display a meaningful response to external stimuli.

Mild brain injury, often called concussion, occurs when a blow to the head produces any loss of consciousness, loss of memory, change in mental status, or focal neurological deficit. It is associated with a GCS score of 13–15. Post-traumatic amnesia, if present at all, lasts less than 30 minutes.

Moderate brain injury is usually defined by an initial GCS score of 9–12, the presence of post-traumatic amnesia lasting from 30 minutes to 24 hours, or coma lasting less than 6 hours. It can cause serious cognitive and behavioral deficits (Table 2), but there is a good chance for improvement. Recovery may take

Table 1. Coma scalesGlasgow Coma Scale*Eye opening*

- 4 Spontaneous
- 3 Reaction to speech
- 2 Reaction to pain
- 1 No response

Verbal

- 5 Oriented
- 4 Confused/disordered
- 3 Inappropriate words
- 2 Incomprehensible sounds
- 1 No response

Motor

- 6 Spontaneous
- 5 Localizes pain
- 4 Withdraws in response to pain
- 3 Abnormal flexion to pain
- 2 Abnormal extension to pain
- 1 No response

Children's Coma Scale*Eye opening*

- 4 Spontaneous
- 3 Reaction to speech
- 2 Reaction to pain
- 1 No response

Verbal

- 5 Smiles, oriented to sound, follows objects, interacts
- Crying
- 4 Consolable
- 3 Inconsistently consolable
- 2 Inconsolable
- 1 No response

Interacts

- Inappropriate
- Moaning
- Irritable
- No response

Motor

- 6 Spontaneous
- 5 Localizes pain
- 4 Withdraws in response to pain
- 3 Abnormal flexion to pain
- 2 Abnormal extension to pain
- 1 No response

weeks to months (sometimes, years) but children often learn to compensate for any residual deficits.

Severe TBI is characterized by an initial GCS score <9, coma lasting more than 6 hours, or post-traumatic amnesia lasting longer than 24 hours. Severe injuries (typically associated with other physical injuries) generally lead to permanent cognitive and behavioral problems.

Associated Conditions

Children and adolescents with TBI have a significant risk of impaired behavioral, cognitive, emotional, and physical functioning that will impede their reintegration into their home and school. We summarize here the secondary conditions commonly associated with pediatric TBI.

Behavior. Parents often bring a child who has had a traumatic brain injury to the doctor because of concerns about the child's behavior. They may not be able to pinpoint the problem, but will describe their concerns by saying, "This is not my child," or "This is not how my child usually acts." Any behavioral difficulties that antedate the brain injury are likely to be exacerbated. It may be difficult to determine how TBI contributes to a child's behavior (which may be due to issues unrelated to the brain injury), but brain injury should always be included in the differential diagnosis. Brain-injured children are at increased risk for psychiatric illness, and should be monitored for this.

Cognition. Cognitive impairment can be the longest-lasting sequela of TBI and the condition that most limits the child's reintegration into the home and classroom. All children with brain injury are at risk for difficulties with attention and concentration, easy distractibility, and impaired short-term memory. In addition they can suffer from deficits in logical thinking and

Table 2. Behavior challenges commonly seen after brain injury

Anger	Emotional lability
Apathy	Impaired judgment
Anxiety	Impulsiveness
Depression	Irritability
Disinhibition	Mood swings
Egocentrism	

reasoning, and impaired cognitive flexibility. Impaired visual and spatial motor skills, and slowed reaction time, contribute to difficulties in the classroom and on the playground; they also increase the risk of further injury.

Language. Injuries to the temporal lobes may produce language problems (aphasia, central auditory processing difficulties, word retrieval difficulties, difficulty writing to dictation, problems organizing thoughts, difficulty understanding multi-step commands, and decreased speed of information processing) that limit the child's academic and functional skills.

Speech. Motor planning problems (oral motor apraxia), dysarthria, spastic dysphonia, and breath control problems all contribute to speech impairment.

Swallowing. Severely injured children may experience swallowing difficulties due to oral motor incoordination, and problems chewing. These impairments may be so severe that they cause dysphagia, aspiration, or poor weight gain.

Cranial Nerve Injuries. Moderate to severe TBI may damage the cranial nerves. There may be anosmia (due to shearing of the olfactory nerves as they travel through the cribriform plate), hearing loss, vertigo or tinnitus (from VIII nerve injury), or facial nerve (VII) palsy. Injury to the optic nerves may lead to scotoma, blindness, or visual field cuts. Extraocular muscle palsies can cause strabismus, diplopia, and difficulty tracking objects. These palsies usually resolve over the year following injury, but must be differentiated from muscle entrapment syndromes seen with orbital fractures (which require immediate surgical intervention). Surgical correction of residual strabismus is usually performed about one year after injury to allow for maximal intrinsic recovery.

Seizures. Seizures following TBI most commonly occur in the first week after injury, but for those with moderate or severe TBI, the risk remains increased up to 2 years after injury. Late-onset epilepsy (more than 1 week after injury) occurs in 8% of severe TBI cases. The following increase the risk of seizure: open skull fractures, an initial GCS <10, cortical contusion, epidural hematoma, wounds with dural penetration, and prolonged PTA or coma. Phenytoin decreases the risk of early but not late post-traumatic seizures in children, and it can impair cognition. There are currently no definitive guidelines regarding the prophylaxis or treatment of post-traumatic seizures. In deciding whether to start or stop anti-epileptic medications in a child with TBI, the primary care provider should consider the child's seizure risk, current serum blood levels of anticonvulsants, recent EEG findings, detrimental side effects of the medicine, and family's concerns.

Motor Control Problems. Problems with motor control most commonly occur after severe TBI, but can complicate mild and moderate injury. Weakness, spasticity, dystonia, impaired motor planning (apraxia, dyspraxia), decreased balance (ataxia), and fine motor tremor can all limit the child's functional independence.

Other Signs. The primary care provider should be aware of the following: hyperphagia following damage to the brain's satiety center; hypothyroidism, precocious puberty, amenorrhea, or growth failure from injury to the pituitary axis; leg length discrepancy and heterotopic ossification from fractures; and an enlarging skull defect (more common in younger children).

Other Symptoms. Symptoms often seen after all types of head injury include headache, neck or back pain, and sleep disorders. Children with severe injury may also have difficulties with bowel and bladder continence due to altered mental status, diminished control, or alterations in diet and exercise.

Management

Those providing primary care to a child with brain injury should perform a careful initial evaluation, provide appropriate treatment and referrals, assist in coordination of services, monitor the child and family's condition over time, offer advice on the prevention of future injuries, and advocate for the rights of both their patient and all children with brain injury.

Evaluation. At the first office visit following any brain injury, the provider should review or obtain a complete medical, developmental, and behavioral history, including a focused search for signs and symptoms of brain injury. Children with mild head injury often come to the doctor's office for initial medical management. If the child is deemed medically stable, the evaluation should include an assessment of the degree of brain injury, using the *Colorado Guidelines for the Management of Concussion*⁸ or the concussion scale developed by Dr. Robert Cantu.⁹ The provider should look for other injuries (fractures, abrasions, internal injuries, etc) and manage them appropriately. There should be a systematic search for symptoms commonly observed after mild head injury (headache, nausea with or without vomiting, dizziness, fatigue, irritability, and anxiety). Before discharging the child home, the family should be given an information sheet listing common signs and symptoms to be watched for after brain injury (see Appendix 1). The child and family should be advised about how to reduce the risk of future concussions, and offered the opportunity to come in sooner than their scheduled appointment if any concerns arise. At future visits, the provider should ask whether the child is (still) experiencing symptoms or if new behavior or school problems have arisen.

Children with moderately severe brain injury are usually hospitalized for observation and care. When they come for follow-up, the hospital discharge summary should be reviewed to determine the degree of brain injury and whether there was any associated trauma. The child's medical, behavioral, and developmental history should be reviewed. There should be a comprehensive physical exam, focusing on cranial nerve testing, and evaluation of the child's strength, balance, muscle stretch reflexes, and praxis. It should also include screening tests of memory, attention, naming skills, reading, writing, and copying as these skills are necessary for school achievement. If the evaluation demonstrates new impairments in any of these areas, a more complete neuropsychological evaluation should be scheduled to determine the child's cognitive strengths and weaknesses.

Children with severe brain injury often have had additional trauma or other medical needs. Facial, thoracic, abdominal, and extremity injuries should be evaluated and addressed. A feeding history is needed to rule out dysphagia or aspiration; if a swallowing disorder is suspected, a modified barium swallow radiograph, or functional endoscopic evaluation of swallowing—or both—should be performed. Impairments of self-care and mobility should be identified, and barriers to school reintegration should be anticipated.

Treatment and Referrals

All medical providers should assess their familiarity with the testing and treatment of patients with pediatric TBI to determine their competency in meeting their patients' needs. Consultation with specialists is warranted when the primary care provider is not comfortable treating the patient alone or when the patient is not responding to treatment. A review of all currently available treatment options is beyond the scope of this article, and readers are encouraged to consult the resources listed in Appendix 2.

Coordination of Services. Primary care providers should ensure that the services provided to each child and family are sufficiently coordinated to reduce fragmentation of care. To improve coordination, a single case coordinator should follow each patient. The authors recommend that this coordinator be hospital-based and begin education and coordination of services in the acute care setting. After discharge, the coordinators can act as a liaison between the hospital, the local primary care provider, the school, and the family. In the absence of such a coordinator, the primary care provider should strive to centralize the child's care information and link the family to appropriate medical, educational, and support services.

Prevention. Medical providers are responsible for educating patients and families about ways to avoid the occurrence (or reoccurrence) of brain injury. Prevention efforts should be tailored to the age of the child and needs of the family. In younger children, baby walkers should be forbidden and stationary activity centers promoted. There should be stair guards at both the top and bottom of stairs. Window locks should be installed where needed in the home. Suggestions should be provided to decrease family stress and thereby reduce the likelihood of child maltreatment. Parents should be reminded about the necessity of an appropriate car restraint system, and car seats should be checked for proper fit and positioning.

Older children should always wear seat belts in the car, even in cars with air bags. Helmets should always be worn when using a bicycle, scooter, or skateboard. Homes, childcare centers, and schools should be checked regularly to ensure the safety of playground equipment, and athletic programs should teach proper technique to minimize head injury. Adolescent drivers

should be counseled to avoid alcohol and other drug use, instructed to monitor their vehicles' brakes, tires, and restraint systems, and reminded to change driving patterns to accommodate to poor visibility or road conditions. We should adopt a graduated licensure system so that young drivers would gain more driving experience. Medical practitioners should advocate lower speed limits throughout the state to reduce head injury and fatalities from high-speed motor vehicle crashes.

Summary

Children who have sustained a brain injury should receive specialized, coordinated, family-centered care from their primary care providers. By knowing more about the etiology, assessment, associated conditions, and prevention of pediatric TBI, medical providers can better address the multiple needs of the child and family as they cope with new challenges. The management of pediatric brain injury can be complex and time consuming, but we must all be responsive to the needs of these children and their families to ensure their good health, their welfare, and their happiness.

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Appendix 1. A Pediatric Brain Injury Sign/Symptom Checklist

Please take a few minutes to check off any of the following concerns for yourself and/or your child since the brain injury occurred:

- | | |
|-------------------------------|---------------------------|
| ___ decrease in smell | ___ change in food tastes |
| ___ ringing in ears | ___ vision changes |
| ___ sudden changes in emotion | ___ impulsivity |
| ___ irritability | ___ depression |
| ___ change in personality | ___ trouble speaking |
| ___ trouble naming things | ___ problems chewing |
| ___ problems swallowing | ___ choking on food |
| ___ attention difficulties | ___ easy distractibility |
| ___ change in appetite | ___ headaches |
| ___ neck or back pain | ___ seizures |
| ___ bowel problems | ___ sleep problems |
| ___ bladder problems | ___ dizziness |
| ___ nausea or vomiting | ___ confusion |
| ___ memory problems | ___ bizarre statements |
| ___ school problems | ___ tics |
| ___ anxiety | ___ violent behavior |

Appendix 2. Resources for Information About Pediatric Brain Injury

<i>Organization</i>	<i>Web site</i>	<i>Telephone</i>
Brain Injury Association of America	http://www.biausa.org/	800-444-6443
Brain Injury Association of North Carolina	http://www.bianc.net/	919 833-9634
Family Support Network of North Carolina	http://fsnnc.med.unc.edu/	800-852-0042
Exceptional Children's Assistance Center	http://www.ecac-parentcenter.org	800-962-6817

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Running the Numbers

A Periodic Feature to Inform North Carolina Physicians and Their Patients

About Current Topics in Health Statistics

Paul A. Buescher, PhD, Editor

Physical Abuse Around the Time of Pregnancy: The Experiences of North Carolina Women

Many women are physically abused during the course of their pregnancy. Prevalence rates vary somewhat, but most studies report that 4 to 8% of pregnant women experience violence. This makes violence more common than pre-eclampsia, gestational diabetes, or placenta previa. Violence has been associated with unintended pregnancy, late entry into prenatal care, pregnancy complications, substance use during pregnancy, and increased risk of poor birth outcomes.

According to the North Carolina Pregnancy Risk Assessment Monitoring System (NC PRAMS), nearly 7% of recently pregnant North Carolina women reported physical abuse during the 12 months before pregnancy, and more than 6% reported abuse during pregnancy.¹ Violence did not end with the birth of the baby; during the first four months postpartum, physical assault was reported by 3% of new mothers, more than three-quarters of whom were injured by the assault. Current or former intimate partners of the women were the most common abusers. The good news is that, even in the face of ongoing violence, abused women were as likely as non-abused women to bring their babies to health care providers for well-baby care.

Given the widespread occurrence of violence to presently and recently pregnant women, the potentially serious adverse consequences of this violence, and the fact that women of reproductive age make frequent contact with health care providers, health care visits provide opportune occasions to "screen" women for violence. The American Medical Association, the American College of Emergency Physicians, the American College of Nurse Midwives, and the American College of Obstetricians and Gynecologists all recommend that health care providers routinely ask their female patients about violence. But most providers do not ask all women, or even all pregnant women, about violence. In this state, only 37% of postpartum women said that a health care provider had asked them about partner violence.² Those who had been asked were more likely to have received prenatal care from a public rather than a private provider, to have had prenatal care paid for by a public rather than private sources, and to be black. Interestingly, women who were screened for violence were *not* more likely to have experienced violence than those not screened.

A number of barriers hinder health care provider screening for violence against women. Providers may feel uncomfortable discussing violence, be concerned about offending patients or invading privacy, feel that they can not do anything about the problem, worry about compromising victims' ability to get or keep health insurance, or fear for the patients' (or their own) personal safety. Other impediments include inadequate provider training about violence, short patient visits, and lack of access to a 24-hour referral source. Many questions remain about the best ways to screen for violence and about the degree to which screening improves the safety and health of women. There seems little doubt, however, that screening is an important part of women's health care.

Physical violence around the time of pregnancy affects thousands of North Carolina women and infants every year. Most of these women come into contact with health care providers during their pregnancies or shortly after delivery. Empathetically asking all women about violence, and assuring that appropriate interventions are provided for those at risk of violence, will improve the health and well-being of North Carolina women and their children.

Acknowledgment: Kathryn E. Moracco, PhD, and Sandra L. Martin, PhD, of the Department of Maternal and Child Health of the UNC School of Public Health and the UNC Injury Prevention Research Center contributed this article. References: (1) Martin SL, Mackie L, Kupper LL, et al. Physical abuse of women before, during, and after pregnancy. *JAMA*

*From the State Center for Health Statistics
www.schs.state.nc.us/SCHS
North Carolina Department of Health and Human Services*

Training School Psychologists in Traumatic Brain Injury

The North Carolina Model

Stephen R. Hooper, PhD, N. William Walker, EdD, Cynthia Howard, PhD

We describe in this article the origins and rationale of a decade-long program to enhance the expertise of school psychologists and other special educators in the domain of traumatic brain injury (TBI). After consultation with representatives of public and private rehabilitation hospitals, schools and professional organizations, the North Carolina State Department of Public Instruction (DPI) began a systematic effort to acquaint relevant school personnel with the various nuances of traumatic brain injury in children and adolescents. Emphasis was on training school psychologists, but efforts also were directed at the use of advanced assessment strategies and evidenced-based treatments. This article reviews both the program's successes to date—its positive impact on school psychologists' work with brain-injured students—and the possibilities for future modifications of the model to make it even better.

Implementing TBI Legislation

Each year, an estimated 75–200 of every 100,000 children in the United States sustain a TBI.^{1,2} Given that 75%–80% of all head injuries are mild in nature^{1,3} and thus may go unreported, the figure is likely to be much larger. In any case, the result is that TBI represents a major educational problem for school-age children and adolescents. Until legislation was introduced in the early 1990s, brain-injured children were usually not identified as needing special educational services, although some school systems accommodated such students by classifying them as Learning Disabled, Mental Retarded, or Multiply Handicapped. In October 1990, Public Law 101-476, the Individuals with Disabilities Education Act (formerly known as the

Education of the Handicapped Act), modified the definition of “children with disabilities” to make children with TBI eligible for special education services. In 1990, the DPI formed a Task Force to assess special education placement of school-age children and adolescents surviving TBI. Implementing the new federal legislation in the state of North Carolina required several important steps.

Step 1: Establishing a State Definition. The first activity of the task force was to adopt a workable definition of TBI, a definition that would satisfy federal standards but also address North Carolina's needs. At that time, a proposed federal definition was much more inclusive, and lumped together TBI caused by external physical forces (like a car accident) with internal events (like stroke); the final federal definition limited TBI to external force injuries only. The current state definition reads as follows:

Traumatic brain injury means an acquired open or closed head injury caused by an external physical force that impairs a student's cognitive, communicative, perceptual, behavioral, social-emotional, and/or physical abilities to the extent that the student requires special education. Congenital, degenerative, or brain injuries induced by birth trauma are not included in this definition^{4, p.4}

Despite the more restrictive nature of this definition, the task force felt strongly that students with all forms of brain injury should be eligible for special educational services. Brain injury rehabilitation specialists have long recognized that brain-injured persons have common characteristics and rehabilitative needs, and that intervention may be helpful, regardless of the disability category. The North Carolina evaluation procedures

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address this concern. A note at the bottom of the TBI section of the placement guidelines reads as follows:

NOTE: Those students with non-traumatic brain injury (e.g., tumor, vascular/circulatory disorders, degenerative diseases, etc.) should be considered for assessment as outlined above^{4,p34}

Step 2: Establishing Special Education Placement Guidelines. With a working definition of TBI in hand, the task force developed a draft of placement guidelines. The draft recommendations were sent to school professionals involved in services for exceptional children, and their comments were incorporated in succeeding drafts. Experts interested in TBI, particularly school psychologists (who work with these children) and pediatric neuropsychologists (who know about brain-behavior relationships and disorders of brain function), were asked to evaluate the proposed placement guidelines. A pediatric focus was important, given the educational issues related to learning, school entry, and general school function encountered by so many TBI survivors.

The inclusion of neuropsychologists meant that North Carolina, unlike nearly all other states, developed two ways for students to be identified as having suffered TBI. One way, which most states have adopted, is medical documentation that a TBI has occurred. This is the usual pathway of entry to services for children who have sustained a moderate to severe injury. But most TBIs are relatively mild in nature, and undocumented mild injuries can still disrupt school functioning. In fact, even mild injuries, if they occur in mid- to late spring, especially in schools that use a year-round curriculum, can disrupt two years of school. So, by allowing comprehensive neuropsychological evaluation to define the cognitive residuals of TBI, North Carolina provided a second way to identify students in need of special education services. Having two portals of entry to services makes it possible to ascertain the full range of injuries and to assess the special education services needed.

Step 3: A School-Based Implementation Model. Once guidelines were completed and approved by the North Carolina State Board of Education, systems and procedures were developed to help schools implement these new guidelines. There were several potential ways to carry out implementation: (1) by using outside clinicians (physicians and neuropsychologists); (2) by sending referred students to centralized assessment centers (as is done with low-incidence handicapping conditions like autism); and (3) by using school-based psychologists. A number of factors led to the selection of school psychologists. The costs of using outside clinicians were prohibitive (a typical neuropsychological evaluation costs \$1,000 or more), so only the most affluent school systems could afford more than one or two evaluations per year. Secondly, it was felt that if school psychologists were involved in the assessment and tracking procedures, they would be in the best position to follow up on students with TBI—perhaps acting as case managers and coordinating the various school services. Finally, since they know the school

environment, they can more efficiently and effectively carry out the arranging of services.

However, most school psychologists have had no training in neuropsychology, TBI, or other neurological disorders, meaning they would need additional (and immediate) training in the assessment and structuring of programs for students with TBI.⁵ A benefit of the additional training is that it would create a cadre of knowledgeable, school-based professionals who could help children with brain injury. This would be particularly advantageous in rural and semi-rural counties where such expertise is less available. To date, North Carolina is the only state to carry out an extensive training program for school psychologists.

Step 4: The Training Model. The task force established a set of core competencies in the area of TBI to be addressed in developing training programs to improve the knowledge base, assessment skills, and intervention functions of school psychologists and related school-based personnel. It was decided to provide training in two parts. The first part would consist of a series of didactic workshops, and the second would use clinical case supervision to ensure competency in working with these children.

The state DPI inserted some “teeth” into the training procedures. A Registry of Approved Providers was created so the Department could identify who was trained and had met the core competencies outlined above. To be enrolled in the Registry, school psychologists have to complete both parts of the prescribed training. School systems that allow school psychologists who are not on the Registry of Approved Providers to work with students with brain injury risk losing state funds for that student.

To ensure competent case supervision during training, prospective supervisors were screened by a state DPI-TBI Subcommittee. Those whose credentials met professional standards for neuropsychology⁶ were placed on a list of “Approved Supervisors.” School psychologists must be supervised in their training by an individual on this list.

Finally, it is worth noting the care that was taken to avoid even the appearance that completing the training program produced a “neuropsychologist.” The training program was meant only to be an introduction to the subject matter of TBI. This concern is apparent in the guidelines’ description of evaluation not as a “neuropsychological assessment,” but rather as “a psychological evaluation for traumatic brain injury.”^{4,p33} Officials from the licensing board for psychology were included in the development of the training procedures to avoid any violation of state licensing laws for psychologists.

The Training Curriculum

The training curriculum was developed to help school psychologists become competent to work with students who had suffered a TBI. Given their relative lack of training in this domain (and

in brain-behavior relationships in general), a detailed overview was deemed necessary to provide a basic understanding of the incidence and causes of TBI, the basic mechanisms involved in a brain injury and—most importantly—the effects of TBI on school performance.

Once school psychologists have this basic information, they need to learn new ways to carry out psychological assessment of these students. For example, the usual battery of psychoeducational tests does not evaluate areas of impairment that are critical for TBI survivors (like disorders of attention, memory, or executive function). The evaluation process would need to address these components. School psychologists were urged to move from a “test-driven” approach to assessment to a “construct-driven” approach.

Previously, school psychologists and other educators rarely knew what to expect from students after a TBI, much less how to intervene with their problems.⁵ School psychologists who were going to be the main force in the assessment process needed to learn new ways to intervene with TBI students. The linkage of assessment to treatment became a critical part of the special education services provided. The Table shows the areas of competency needed, the training objectives, and the specific training processes used.

To achieve core competencies and training objectives, the task force developed an extensive training program, which has two major components. The first component consists of three didactic workshops comprising about 42 hours of instruction (approximately the duration of a graduate level course). The first, three-day workshop introduces participants to basic epidemiological data such as incidence and prevalence of TBI; causes and mechanisms of TBI; medical, cognitive, and social-emotional outcomes of TBI; basic elements of neuroanatomy; and brain-behavior relationships. It provides initial exposure to neuropsychological techniques and instruments used to assess TBI, and to program alternatives like school re-entry for brain-injured students. The second, two-day workshop on advanced assessment strategies and techniques provides detailed information about a construct-based approach to assessment. The quantitative and qualitative assessment strategies introduce a number of tests that have been largely unfamiliar to school psychologists. There is specific information on neurocognitive functions (motor, sensory, attention, language, visual processing, memory, and executive functions), and specific strategies for assessing them. The third, two-day workshop uses case-study scenarios of various kinds of TBI to teach specific intervention approaches and techniques on the following topics: the importance of linking assessment to treatment in working with brain-injured students; hospital/school liaisons; school re-entry issues; and the use of case monitoring strategies to follow the student through the recovery process. Much of this didactic material has been summarized in a “best practices” manual produced by DPI.⁷

After their didactic training experiences, participants begin the second major component of their training. This involves 30

hours of case supervision under the guidance of an approved supervising neuropsychologist. The supervision, either in an individual or group format, typically involves discussion of specific TBI cases that covered a full range of topics from pre-assessment data collection, through the nature of a particular TBI and associated prognosis/recovery issues, through assessment strategies in the school setting and school-based interventions, to monitoring of progress. Case supervision adds a clearly practical component to the training, and, at its best, uses active cases from within a school psychologist's own school system.

After completing all phases of the training, school psychologists are listed by the DPI Registry as Approved Providers of services to students with TBI. The listing acknowledges their training and allows them to work directly in the evaluation, consultation, and school programming of students with TBI.

Evaluation of the Training Initiative

One of the DPI's major goals was to improve the training of school psychologists in the area of TBI. Participants have been unequivocally positive in their evaluation of the workshops and supervision groups, and have clearly articulated the need for such training. In fact, many have requested refresher workshops to continue their leaning in this domain.

To date, 557 (83%) of North Carolina's 675 school psychologists have completed at least part of the training required by the Registry of Approved Providers; about 200 (nearly 30% of the total workforce) are currently listed in the Registry of Approved Providers. There was a concern about whether this training would reach all 117 school systems in the state. For example, would urban areas be more likely to train and retain school psychologists and rural areas less likely? The numbers are a bit elusive because school psychologists move in and out of state, change jobs within their systems, and retire; but it is estimated that one or more persons have completed some or all of the training in at least 80% of systems that employ school psychologists. School systems in the eastern part of the state, particularly the northeast, may have the fewest number of persons trained. However, only about 13 Registry-approved supervisors represent both urban and rural areas. Given the relative dearth of pediatric neuropsychologists, the uneven distribution of these professionals across the state remains one of the key areas of need.

Future Considerations

To our knowledge, North Carolina's DPI is the only state department in the country that has attempted to train school psychologists in the area of TBI. To date, the program has been quite successful in overcoming the relative lack of training of school psychologists regarding the unique but dynamic needs of students who have suffered a traumatic brain injury. Now,

Table. Core competencies, training objectives, and training mechanisms used by the North Carolina Department of Public Instruction to teach school psychologists about TBI

<i>Core Competencies</i>	<i>Training objectives</i>	<i>Training mechanism</i>
Increase the knowledge base of school psychology work force and other special educators in the area of TBI.	- Increased understanding of Brain-based relationships; Epidemiology of TBI; TBI causes and mechanisms; Medical, cognitive, educational, and social-emotional issues and outcomes following a TBI; The TBI recovery process; Assessment and treatment needs of this population.	Workshop 1 Workshop 2 Workshop 3 Case Supervision
Increase the skills of school psychologists in psychological assessment of students with TBI.	- Increased range of skills in assessing of students following a TBI. - Increased understanding of a neurocognitive construct-driven approach to assessment. - Increased utilization of traditional psychoeducational procedures in the assessment of students following a TBI.	Workshop 1 Workshop 2 Case Supervision
Increase the intervention skills of school psychologists for students with TBI.	- Increased understanding of the various approaches to intervention and rehabilitation in TBI. - Increased range of intervention skills for students with different TBI severity. - Increased consultation skills in working with teachers in the treatment of students following a TBI. - Improved tracking and monitoring of students following a TBI.	Workshop 1 Workshop 3 Case Supervision

after having completed a decade of training, we must consider five issues for the future.

(1) It is important that training be conducted on a systematic basis and linked tightly to other state initiatives aimed at training personnel throughout the state. This could be cost-effective, and remove a fiscal burden from DPI. A systematic, state-based training model would facilitate educating the entire state work force, but will require increased collaboration across departments and divisions in the state. In addition to training professionals from various state agencies, such collaboration undoubtedly would increase knowledge about and the cataloging of state and regional resources for TBI survivors and their families.

(2) Over the past 10 years we have been relatively successful in achieving the original goals of the DPI, but our understanding of and knowledge about TBI is changing rapidly.⁸ It is important that updated information be regularly communicated to school psychologists and other professionals who work with persons suffering TBI. One mechanism would be regular (annual or bi-annual) "booster sessions" to discuss current advances in this field and bring school psychologists and other school personnel abreast of current literature on TBI, particu-

larly as it applies to school functioning. In addition to providing current information, these booster sessions could emphasize school transitions; help link students to other, community-based providers outside the school; and increase the focus on families and the coordination of services.

(3) Most of the costs for the didactic and supervisory components of training have been borne by DPI, individual school systems, and participants. The training program was developed along the lines of a semester graduate course in hopes that the model would be adopted by School Psychology Training Programs. This has not yet occurred. These programs already have full course loads, but elective classes could be established—or core courses modified—to cover TBI-related materials derived from the state-based curriculum. There are beginning efforts to address some of these training needs, but we need more discussion to determine what hinders the inclusion of all or part of this material in school psychology training programs.

(4) Psychologists in school systems across North Carolina have acquired an impressive degree of training, but concerns remain that resource-poor and rural school systems are likely not to have a Registry-approved school psychologist on staff. Spe-

cific efforts should be aimed at getting training and expertise to these systems. For instance, the state might subsidize and target training initiatives to specific school systems, although that would not necessarily prevent school psychologists from moving out of the district. It may be that the school-based model is not the most appropriate or most cost effective model for providing service in certain districts. We need to re-examine and possibly modify the training model to meet the needs of particular school systems. One by-product of the present training model has been the sharing of tests and procedures across school system lines. Perhaps a similar arrangement could allow neighboring school systems to provide assessment and consultation services by a TBI-trained school psychologist to systems without such services. Another model might use state-based Autism Centers as resources of trained school psychologists to provide for the TBI needs of a region—including school systems without a trained individual on staff. There are other ways to address our needs, and additional discussions should be helpful in sorting out what to do.

(5) Given the importance of getting trained personnel involved with students who have suffered a TBI, it might be advantageous to extend the training model to establish school-based teams to deal with all neurologically impaired students. Because of the relatively low prevalence of TBI, such teams could focus on pediatric neurologic disorders in general—strokes, seizures, tumors—and include TBI. This would justify the creation of teams separate from the school-based teams that

already deal with special education needs of students. These teams should be interdisciplinary in nature and, by design, could facilitate case-finding efforts, school transitions, assessment, intervention, and tracking for students with neurological problems. A team of school-based experts could facilitate community liaison with other health-care providers and hasten the delivery of special education services when necessary.

The training program described here has been innovative in its development and noteworthy in its execution. It undoubtedly has improved school-based services available to students who have survived a TBI. Linkages to other state-based training initiatives and modifications in the current curriculum will continue to propel the program forward and impact positively on professionals who work with children with brain injury. Our schools have many persisting needs, but it is important to note that our school psychology work force today is one of the country's most knowledgeable and best trained in the area of TBI. This can only contribute to improving the services we provide to students who sustain a TBI.

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Recreational Therapy Can Help Adult Brain Injury Survivors Get Back into the Community

Jan S. Hodges, PhD, Karen Luken, MSRA, and Betsey Zook, MA

You know what it is when you open a door you have never seen before. Betsey has boosted me, given me so much encouragement; she is making me want to be more independent."

—A TBI survivor comments on how recreational therapy services affected her.

How can one describe the impact of traumatic brain injury? Survivors and family members are rarely prepared to deal with the medical emergency, with the physical, cognitive, and emotional consequences of the injury, with the cost of treatment, with the stress of re-establishing life.¹ There are a number of strategies used during the crisis period to help survivors and those who support them address these consequences. However, too often we overlook or under-emphasize the way decreased social contact, depression, and loneliness create major challenges to rehabilitation and pose a lifelong threat to overall health and well-being. We know that during the first two years after injury, the social support network of survivors decreases significantly and pre-injury friendships dissolve. This increases depression and contributes to low self-esteem and anxiety.² A significant percentage of survivors of brain injury lose their jobs and remain unemployed, further decreasing social contact and relationships.³ As peer support lessens, dependence on the family may increase, and thus families report that their loss of social contact is a major problem.⁴

Many manifestations of brain injury affect functioning and quality of life. Irritability, impulsivity, decreased spontaneity and flexibility, and depression are common. They pose significant challenges to individuals attempting to re-engage in community activities and reconnect with their social networks.⁵

Impaired memory, especially short-term memory, may make it difficult to remember how to use equipment, or the rules of a given activity; how to find one's way around town; or to recall names and faces. Some individuals have difficulty with fine and gross motor skills, visual acuity, or deficits in the attention and concentration skills required for successful participation in specific activities. Lack of social confidence or inability to recognize social signals can lead to embarrassing social interactions for the survivor and others.⁵ In addition, low or fluctuating energy may be misinterpreted as a lack of motivation or non-compliance.

Some acquired deficits are addressed during the rehabilitation process as patients relearn skills, generalize skills to new environments, and develop compensatory strategies. However, the functional skills established during in-patient care can be lost if individuals do not use those skills after they are discharged. Social isolation and an increase in unstructured time further lessen the opportunities to use and maintain skills. Brain-injured adults say that one of their concerns is "the lack of anything to do," and the fact that the survivor and family "receive little help with figuring out how to make use of all the free time."

Recreation for Rehabilitation

Recreational therapists are "a profession of specialists who utilize various methods to promote the independent physical, cognitive, emotional, and social functioning of persons disabled as a result of trauma or disease by enhancing current skills and facilitating the establishment of new skills for daily living and community functioning."⁶ Recreational experiences and activities become purposeful interventions to help change, treat, or otherwise ameliorate the effects of illness and disability so that individuals achieve optimal functioning, independence, life satisfaction, and quality of life.⁷

The processes used by recreational therapy are similar to

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Table 1. Sample assessment questions

- Tell me about the things you want most out of life.
- If you could change anything about your recreation, what would you change?
- Does anything get in your way of participating in your recreation interests?
- Are you satisfied with how you get along with other people?

those of other health professions: referral for services, assessment, development of individualized treatment plans specifying relevant goals and measurable objectives, selection of purposeful interventions, evaluation of progress, and discharge and transition. While in a recreation activity, the patient may focus on the activity, but the recreational therapist is focusing on the treatment goals and outcomes that will result from the intervention. Many recreational therapy interventions take place in "real world" settings like restaurants, malls, and libraries.

Recreational therapy is not just fun and games. The skills learned and strengthened in recreational experiences carry over to other life domains (jobs, support networks, and school). Recreational therapy provides an important service in meeting the needs of persons with brain injuries. The outcomes achieved through satisfying recreation experiences include better jobs,⁸ reduced effects of disability, bolstered self-confidence and self-esteem,^{7,9} improved self-determination, friendships, and social supports,¹⁰ and reduced reliance on the health care system.⁷ Recreational therapy services and supports are available through hospitals, rehabilitation facilities, community recreation programs, private organizations like the Arc, and governmental agencies like the NC Independent Living Services.

A Model Project

Services and Supports for Persons with Brain Injury (SSPBI) was the name of a three-year grant from the US Department of Education, Office of Special Education and Rehabilitation Services, to the Department of Recreation and Leisure Studies at the University of North Carolina at Chapel Hill. SSPBI sought to create and refine community-based, post-discharge rehabilitation support for persons with brain injury living in predominantly rural areas of North Carolina. It also sought to provide a model of how integration into community activities could promote lifelong rehabilitation and development. The project's components (individual recreational therapy services, technical assistance to brain injury support groups, and training for community recreation providers) had the following goals:

- Decrease the social isolation of those with brain injury,
- Strengthen the skills that contribute to successful

community life,

- Help peer support groups use computer technology to meet social and educational needs of members,
- Improve the responses of communities to individuals with brain injury.

Project participants came from three non-metropolitan North Carolina communities. Candidates for participation were suggested by the North Carolina Brain Injury Association, Area Programs for Mental Health, Developmental Disabilities, and Substance Abuse Services, Vocational Rehabilitation, and by self-referral. To be included in the project, persons had to have a history of a brain injury, reside in one of the targeted communities, and have a personal interest in participating.

Twenty men and three women, 24-59 years of age, participated in the project; 16 were white and seven were black. Most participants had severe injuries that had occurred more than three years before they enrolled in the project. Less than 10% of participants lived alone; approximately 40% lived with a spouse, and 50% lived with family or received residential support from paid staff.

A certified therapeutic recreation specialist (CTRS) met weekly with participants for 6-8 months. Sessions were conducted in the participant's home or in a community location appropriate to the participant's goals and agreed upon by the participant and CTRS. From the first session, the CTRS worked to build a therapeutic alliance and partnership with the participant, based on meeting that person's individual goals. Many of the participants had come to think that meaningful community activity was impossible or not worth the trouble, so getting them to dream—to think *What if I could?*—was difficult, but important; only by doing so could the participant and therapist develop a plan for re-entering or becoming more involved in the community. The assessment format, modified from earlier projects conducted by the Center for Recreation and Disability Studies at the University of North Carolina-Chapel Hill, reflected principles of person-centered planning and self-determination. A structured interview process (Table 1), often requiring two to three sessions to complete, identified life goals, perception of abilities, current social and community resources, current activity levels, health and safety concerns, and potential barriers for achieving goals.

Recreational therapy has the great advantage that activities are chosen that are personally meaningful to and desired by the participant. The process allows each person to use strengths already possessed to facilitate development of new ones—while simultaneously having a good time—and even to do things previously thought impossible. Because the intervention was time-limited, not all dreams could be addressed; but the most important and appropriate ones could be focused upon. Decisions about selected goals were based on the participant's desires, the scope of practice of the CTRS, and the probability of accomplishing the goal during the project's life span. For example, a participant might dream of feeling "normal," defined by the participant as, "able to come and go when I want and hang

out with people I choose." The short-term community integration goal might be to develop or strengthen skills needed to participate independently in community activities, or to initiate and maintain social contacts.

In implementing the process, the CTRS outlined a structure of beginning, intermediate, closing, and continuation steps toward the ultimate goal (Table 2). The strategy was completed by soliciting responses to prompts such as, "What do we need to do first to accomplish this goal? What do we need to do next? What resources and supports will you need to continue after we are no longer working together?"

Community integration was a primary mechanism by which participants achieved their goals, and at times it was the intended outcome. To achieve access to community activities, participants needed to learn new compensatory skills such as developing daily routines, using weekly calendars, and recording questions and answers over the telephone. The CTRS broke down the global tasks into small steps that could be accomplished incrementally using written outlines. Repetition, the key to the learning process, took the form of repeating similar routines during each session and giving "homework" tasks to be completed between sessions. In addition, the CTRS provided brain injury education and strategies for accommodating the participants' goals and needs in local recreation and community agencies. During the final weeks of participation, the CTRS "faded" into the background, allowing participants to assume greater responsibility and gain control over their schedules, activities, and social interactions.

A Case Example

Loretta, a 58-year-old black woman, lives with her husband in a rural North Carolina community. She has grown children, and previously worked as a care-giver for residents of a state center for the mentally retarded. About three years before she participated in the project, she was severely brain-injured in a motor vehicle accident. Before the accident, Loretta had been a socially active person, involved with church bible study, choir, and other activities. When the CTRS began working with Loretta, she was spending most of her time at home watching religious television programs. She did maintain telephone contact with family members living in other states, and occasionally church members would come to visit or to take her to bible study.

Table 2. Examples of goal and strategy

Goal:	To participate in rewarding social activities in the community at least 3-4 times per week, and to be able to independently schedule and plan for ongoing participation.
Strategy:	<p>Beginning steps</p> <ul style="list-style-type: none"> ◆ Identify possible activities ◆ Identify local resources ◆ Research transportation options <p>Intermediate steps</p> <ul style="list-style-type: none"> ◆ Select preferred activities ◆ Sample community activities ◆ Choose activities to continue ◆ Develop or strengthen activity and compensatory skills ◆ Begin scheduling activities weekly <p>Closing steps</p> <ul style="list-style-type: none"> ◆ Maintain weekly schedule ◆ Increase independence for ongoing participation <p>Additional steps</p> <ul style="list-style-type: none"> ◆ Involve social network in ongoing plans as needed

She continued to attend church on Sundays with her husband.

Her husband worked full-time, so Loretta spent most of her day at home alone. She was receiving outpatient mental health counseling for depression, but some days she would not even get out of bed. On good days she would move to the living room to watch TV, but stayed in her sleeping clothes. Her days held few productive tasks. She was independent in self-care, and walked with a four-point cane, but could not drive. She reported difficulties with memory, and with organizational tasks. Although Loretta described herself as a "people person," she admitted to minimal self-confidence in social settings. For the first month of sessions with the CTRS, Loretta requested that a friend be present to help her express herself accurately.

Loretta described her life goals as becoming able to give to and care for people again. Together, the CTRS and Loretta agreed that her project goal would consist of increasing participation in meaningful activities with people outside of her home. Loretta and the CTRS brainstormed together, seeking activities that might match her interests and desire to give back to others. The CTRS used role-playing to help Loretta figure out how to make informational phone calls to community agencies, and prompted her to write down questions before calling, as well as the answers to her questions. Homework assignments consisted of making informational inquiries to community agencies, which enabled her to develop independence and broadly useful skills. The recreational therapist taught Loretta to use rural public transportation systems in her area, to apply for reduced fares, and to schedule curb-to-curb van service for travel across a multi-county area.

As Loretta gained confidence, the CTRS prompted her to make appointments with various community agencies to determine whether they were "a good match for her." Loretta then toured selected facilities (the local senior center, the library, and the YMCA), asking the questions that she had drafted before the meeting, and evaluating the suitability of the facility. Loretta chose to volunteer for a children's program at the local library, attend weekly bible study at the senior center, and participate in water aerobics three times a week at the YMCA. Loretta attended a computer skills workshop established by SSPBI, and she scheduled time every week to keep up with the Brainspot (www.thebrainspot.com) message board and to email new cyber-friends. The CTRS introduced the use of a daily planner and routines to coordinate her schedule, and eventually arranged to meet Loretta at selected community sites, reinforcing Loretta's use of the public transportation system.

As Loretta's independence grew, the CTRS shifted toward monitoring, mentoring, and helping with problem-solving. Today Loretta independently maintains an active schedule, spending four to six days per week out of her home and participating for almost 40 hours per week in activities she finds meaningful (previously, she had been spending only one hour per week out of her home). She has been able to transfer her new skills and confidence to new activities and environments. She also shows increased self-confidence in her leadership role in the weekly computer group and online discussion board.

Outcomes and Implications

During SSPBI, the recreational therapist strove to have participants develop skills that would allow them to participate in activities of their choice, sustain increased levels of independence, increase their confidence, and improve overall life satisfaction. Across the entire group of participants, depressive symptoms diminished, and there were positive changes in peer relations, increased activity levels, increased time out of bed, and increased involvement in a variety of community and social roles, including volunteering.

These positive outcomes are pertinent to success in recreation as well as in other life domains like employment and education. Because participants had more confidence in gathering information by phone about recreation opportunities, they could make calls about employment and where to find support for vocational rehabilitation. Some began to use public transportation to reach community recreation resources, which also expanded their employment and social opportunities.

It is critically important that rehabilitation services address the challenges faced by persons with disabilities that persist after intensive, facility-based rehabilitation ends. Services must build on and strengthen each person's abilities, interests, strengths, and needs. Recreational therapy is well suited to this

mission because it embraces a definition of health that includes not just the absence of illness but also the enhancement of physical, cognitive, affective, and social development.⁶ It promotes independence and quality of life¹² for persons with brain injuries. Professionals serve people where they live,⁸ provide opportunities to use and master skills,⁹ and promote universal design and access. The SSPBI project has successfully demonstrated that it is possible to provide cost-effective services that meet the individual psychosocial needs and desires of consumers and families.¹³

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North Carolina's TBI Project ACCESS

Assuring Coordinated Care, Education, and Support for Survivors of Pediatric Brain Injury

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Traumatic brain injury (TBI) is the most common cause of disability and death among children and adolescents in the United States.¹ Even those who survive brain injury often find their lives transformed forever, with a host of new impairments, stressors, challenges, and needs to be met. Early identification and appropriate treatment of TBI, coupled with education, emotional support, and aggressive case coordination and follow-up are critically important to achieving the best possible outcomes. Successful transition from hospital to home and school often requires a team of trained professionals working together with the child and family. Too often the coordination is poor, and there is a lack of awareness of available resources.

Passage of the TBI Act of 1996 allowed North Carolina to identify children with TBI, and to help them and their families address the medical, social, and educational challenges they face. A statewide advisory panel made up of health care and community agency professionals, administrators, educators, and survivors helped develop an innovative model of service delivery. Funds for a three-year demonstration project were secured from the Health Resources and Services Administration (HRSA), with matching funds provided by the North Carolina Department of Health and Human Services (DHHS); the Brain Injury Association of North Carolina; and three Level 1 trauma centers (UNC Hospitals, Pitt County Memorial Hospital/ECU Brody School of Medicine, and Carolinas Medical Center) located in Chapel Hill, Greenville, and Charlotte, respectively.

The demonstration project set as its goals to ensure that

(1) children whose injuries did not require hospitalization

receive appropriate and timely screening, intervention, and follow-up to help them return, as nearly as possible, to their pre-injury level of function;

(2) children whose injuries require hospitalization receive coordinated care and follow-up;

(3) participating families are supported throughout the initial recovery process;

(4) families, healthcare professionals, community service providers, and the general public get appropriate training and distributed materials; and

(5) collection of data regarding pediatric brain injury be improved; and

(6) the state of North Carolina could maintain and replicate this service delivery model.

Implementing the Model Program

To address the project goals, the three participating hospitals each created a new position, that of a community transition coordinator (CTC). The CTC carries out daily activities of the project (identifying children with TBI; educating hospital staff, community professionals, and families about the special needs and resources available to these children and their families; and ensuring that injured children receive the services needed to return home successfully). CTCs were recruited from a variety of backgrounds, including social work, education, nursing, and rehabilitation. All were provided with a laptop computer, an office in the hospital, a budget for educational materials, and a

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stipend for travel to provide case management, training, and technical assistance in local communities. All CTCs learned about pediatric brain injury at the start of the project and received ongoing supervision and guidance by a doctor specializing in pediatric rehabilitation medicine.

Each day, the CTCs screened patient record logs in the hospital's emergency department (ED) to ensure identification of children (up to age 18) with TBI. Relevant charts were evaluated for symptoms, physical findings, results of radiographic studies, and discharge orders or instructions. When appropriate, CTCs used the Colorado Medical Society's Guidelines for the Management of Concussion in Sports² to categorize the severity of mild head injury. Hospitalized patients were identified from admission reports of the pediatric trauma services and through referrals from health care providers, social workers and teachers at each hospital. CTCs helped educate children and their families about TBI, dispensed educational materials when indicated, and served as the central coordinator of care in the hospital and, later, in the child's local community. CTCs surveyed the families at one, four and ten months after injury to evaluate the condition of the child and the family, refer children to community resources, and facilitate the delivery of appropriate services.

Pediatric brain injury clinics were established at all three hospitals so that CTCs could assist both families and clinicians during clinic visits. CTCs played key roles in educating hospital providers and the public about the importance of identifying and caring for children with brain injury. Over the course of this project they became experts in pediatric TBI, providing over 200 presentations about the subject at in-service trainings, hospital grand rounds, local and statewide conferences, and national programs. To prevent further injuries, they counseled patients and families, held educational programs, and provided bicycle helmets and child safety seats.

During its three-year life, the project identified over 2,100 children at the three participating hospitals who had sustained a TBI. Personnel from the Dickson Health Research Institute reviewed data compiled by the CTCs to determine characteristics of the population served, symptoms reported by the injured children's families, and types of services provided (dispensing information, assisting with referrals, and facilitating appointments). Types and numbers of educational offerings were recorded by CTCs, and compiled by the project's advisory board. The Brain Injury Association of North Carolina found a high rate of satisfaction rate with support services, education, and printed materials provided.

A Statewide Model System of Care for Children with TBI

There are many state and national resources for families of children with brain injury (see Appendixes 1 and 2), but CTCs and other Project ACCESS personnel identified a number of barriers that must be addressed if North Carolina is to ensure

that children with TBI receive optimal services. We have aggregated these barriers into problems into six groups: (1) identifying TBI; (2) delivering healthcare services; (3) education; (4) coordinating care; (5) school reintegration; and (6) preventing further injury. We outline here the identified barriers and our recommendations for attaining a statewide system of optimal care for children with TBI.

Identifying TBI in Children

Barriers

- (1) Lack of appropriate screening for, and documentation of, pediatric TBI by emergency medical services and emergency department personnel;
- (2) Insufficient use of standardized assessments of pediatric brain injury by medical personnel;
- (3) Focus on physical injuries (thereby overlooking post-traumatic cognitive deficits);
- (4) Failure to diagnose brain injury when it is mild or when it accompanies other extensive trauma;
- (5) Failure of the statewide trauma registry to enroll all cases of pediatric head injury.

Recommendations

- (1) Make the children's version of the Glasgow Coma Scale³ and the Standardized Assessment of Concussion⁴ part of pre-hospital and emergency department training; encourage their use in all relevant pediatric cases.
- (2) Educate medical personnel about the possibility of brain injury even when this is not the primary problem or when there has been no loss of consciousness.
- (3) Screen emergency department logs to identify children who have sustained injury to or near the head, who have relevant complaints, or who have two or more symptoms of concussion (see Table); investigate their history and status in order to identify those who have sustained TBI.
- (4) Review daily hospital census sheets and identify children with history of head injury, decreased GCS, or loss of consciousness as having sustained a TBI.
- (5) Develop a system in which hospitals work together with the NC Trauma Registry to capture and record all cases of pediatric head injury.

Delivering Appropriate Healthcare Services

Barriers

- (1) Lack of a standardized TBI symptom checklist to be used in all outpatient clinics;
- (2) Overlooked or late referral of hospitalized patients to rehabilitation services;
- (3) Failure to search for cognitive deficits beyond determining that the child is awake, alert, and oriented;
- (4) Lack of formal, TBI-specific support services for fami-

lies of hospitalized children;

(5) Too few and inadequately used outpatient pediatric TBI Clinics;

(6) Insufficient developmental follow-up of "shaken babies" and those with early childhood head injury.

Recommendations

(1) Train health care personnel to assess cognitive status beyond a notation that the patient is "awake, alert and oriented to person, place, and time";

(2) Request the help of Rehabilitation Medicine, Speech Therapy, Occupational Therapy and Physical Therapy services early in the hospitalization of those with brain injury;

(3) Establish outpatient pediatric TBI clinics at each major trauma center hospital and make services available to patients from outlying community hospitals;

(4) Implement a hospital discharge system that ensures appropriate and timely referral to the child's local physician, or TBI clinic, or both;

(5) Provide all pediatric clinics with a standardized symptom checklist to help practitioners in their follow-up evaluations children with TBI;

(6) Arrange for personnel practicing at community hospitals to be trained in the diagnosis and management of pediatric TBI;

(7) For one year post-injury, have a child service coordinator and pediatric therapist track development of all children with shaken baby syndrome or early childhood TBI.

Education About TBI

Barriers

(1) Insufficient education provided by emergency medical services personnel to children (and families) seen but not requiring hospitalization;

(2) Insufficient family education about brain injury before discharge from the ED;

(3) Variable quality of "head sheets" (single-page handouts defining brain injury, describing common signs and symptoms, listing warning signs requiring further evaluation, and giving local resources to contact for more information) used in EDs throughout the state;

(4) Rapid discharge from hospital with little time to educate

Table. Identifying traumatic brain injury in children

Events suggesting the possibility of TBI

Assault
Chin lacerations
Dizziness
Fall
Head laceration

Bicycle accident
Concussion
Facial injuries
Head injury
Scalp laceration

Symptoms and signs suggesting TBI

Headache
Ringing in ears
Intolerance of bright lights
Nausea or vomiting
Double vision
Fatigue
Memory problems
Vacant stare
Disorientation
Confusion
Slurred speech
Inattention/Distractibility
Delayed verbal responses to questions or instructions
Incoordination/Delayed motor responses

Dizziness
Intolerance of loud noises
Light-headedness
Blurred vision
Anxiety
Sleep disturbance
Irritability
Dazed appearance
Amnesia
Lack of awareness of surroundings
Unsteady gait
Muddled thinking

families and others about TBI;

(5) Inconsistent provision of written material about brain injury at the time of hospital discharge;

(6) Lack of relevant material for non-English speaking families;

(7) Medical professionals who are not aware of the epidemiology, signs, symptoms and outcomes of mild head injury.

Recommendations

(1) Provide a "head sheet" to the family of each child seen and released by emergency personnel in the field;

(2) Prepare packets listing information and resources about TBI for distribution in hospitals and doctor's offices;

(3) Via emergency room personnel, CTC, social worker, nurse educator, chaplain, or discharge planner, provide written information and a list of resources to the families of all children who have sustained injury to or near the head, or who have symptoms of concussion;

(4) Have hospital EDs distribute a comprehensive "head sheet" (like *When Your Child's Head Has Been Hurt*, designed by the state of Arizona and tested in NC) to families of all children suspected of having sustained an injury to the head;

(5) Direct families to the Brain Injury Association of North Carolina as a primary source of information about brain injury;

(6) Have educational materials available in Spanish and other languages;

(7) Have an interpreter present when educating non-English speaking families about TBI;

(8) Provide standardized staff training on pediatric TBI

to all Emergency medical personnel in NC, the staffs of every hospital in NC, and to interested community and private service providers.

Coordinating Care for Children with TBI

Barriers

- (1) The responsibility for providing support, education, and transition services to children with TBI is fragmented.
- (2) There is a tendency for other severe injuries to obscure the presence of TBI when children are hospitalized.
- (3) Families may not understand the need for follow-up evaluation because some signs and symptoms may not yet be apparent.
- (4) There is poor communication between the hospital and the child's primary care provider (or lack of primary care provider).
- (5) There is poor communication between multiple medical specialists and the child's primary care provider.
- (6) Coordination of multiple follow-up clinic appointments is poor.

Recommendations

- (1) Adopt a system that facilitates communications between the family, medical team, therapy team, and school.
- (2) If possible, have one person coordinate care for the child, and communicate with the family in the hospital and during transition back to the community.
- (3) Develop a common referral pathway to assure coordinated care in the acute care setting.
- (4) Assure that the child's primary care provider knows about the injury.
- (5) If there is no primary care provider, one should be identified and arrangements made for follow-up before the patient is discharged home.
- (6) Develop and implement a pre-discharge protocol to ensure continuation of services.
- (7) Have hospital doctor(s) emphasize the importance of follow-up visits, because some symptoms may not be immediately apparent but can surface at a later date

School Reintegration for Children with TBI

Barriers

- (1) Failure to identify school problems that antedate the brain injury;
- (2) Poor communication between hospital and school;
- (3) Poor communication among relevant school personnel about the TBI;
- (4) Tendency for children with TBI to "fall through the cracks" after returning to school;
- (5) Symptoms of TBI ignored in children with pre-existing

learning or behavior problems;

- (6) Under-utilization of neuropsychologic evaluation by school personnel;
- (7) Insufficient training of school personnel about pediatric TBI;
- (8) Failure to appreciate the dynamic nature of TBI and its effects in the classroom and beyond.

Recommendations

- (1) Investigate any pre-injury school problems because they are likely to be exacerbated by TBI.
- (2) Alert the school coordinator for exceptional children who, in turn, will alert the child's homeroom teacher about the child's diagnosis and possible need for special education.
- (3) If TBI has led to significant changes in cognition, schedule neuropsychological evaluation of the student's cognitive strengths and weaknesses by an appropriately trained school psychologist.
- (4) When available, all school staff who will interact with the student should review and use the neuropsychological evaluation.
- (5) Use the results and recommendations of neuropsychological evaluation in planning compensatory classroom strategies that are part of the child's Individualized Education Plan.
- (6) Provide ongoing training of school personnel in the best practices of assessment and programming for students with TBI (see article by Hooper et al on page 350).

Prevention of Pediatric TBI

Barriers

- (1) Insufficient discussion about head injury prevention during routine health care visits;
- (2) Failure to discuss the fact that one TBI increases the risk of another;
- (3) Lack of discussion about head injury prevention in school health classes;
- (4) Improper or no use of child restraints in cars/trucks;
- (5) Erratic use of bicycle helmets.

Recommendations

- (1) Ban use of baby walkers.
- (2) Promote the use of stair guards at top and bottom of stairs where young children live or play.
- (3) Promote the use of window locks to prevent falls.
- (4) Implement programs to decrease family stress that leads to child maltreatment.
- (5) Promote and enforce the use of properly positioned car restraint systems for children.
- (6) Enforce the use of helmets by all children using bicycles, scooters, or skateboards.
- (7) Promote measures to improve the safety of all playgrounds.

(8) Ensure instruction of proper technique to minimize head injury in formal athletic programs.

(9) Counsel all adolescents to avoid alcohol and other drug use.

(10) Support the use of graduated automobile driver's licensing to give young drivers more driving experience.

(11) Advocate decreased speed limits on roads throughout the state to reduce head injury and fatalities from high-speed motor vehicle crashes.

Summary

Over the past three years, families, school staff, and healthcare personnel in our state have benefited from an innovative service delivery system designed to demonstrate that we can improve the lives of children with TBI. Project ACCESS has used hospital-based pediatric brain injury Community Transition Coordinators to identify, coordinate care, educate, support, and generally improve the lives of thousands of children with TBI.

The project also uncovered a host of barriers that adversely affect the future of many of North Carolina's most vulnerable children. We hope that this article helps delineate the challenges faced by our state's healthcare and educational systems, and contributes to the adoption of a statewide model system of care for children with brain injury.

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Appendix 1. North Carolina Resources for Pediatric Brain Injury

Organization	Web site	Telephone
Local hospitals		
Local primary care providers		
Regional/tertiary medical centers		
NC Emergency Medical Services	http://www.ncems.org/	919-733-2285
Brain Injury Association of North Carolina	http://www.bianc.org/	919-833-9634
NC Dept. of Public Instruction	http://www.dpi.state.nc.us/	919-807-3300
NC Dept. of Health and Human Services	http://www.dhhs.state.nc.us/	919-733-7011
NC Safe Kids Injury Prevention Program	http://www.ncsafekids.org	919-733-3901
Exceptional Children's Assistance Center	http://www.ecac-parentcenter.org/	800-962-6817
Family Support Network	http://fsnnc.med.unc.edu/	800-852-0042
Governor's Advocacy Council for Persons with Disabilities	http://www.doa.state.nc.us/doa/gacpd/gacpd.htm	800 821-6922

Appendix 2. National Resources for Pediatric Brain Injury

Organization	Web site	Telephone
Brain Injury Association of America	http://www.biausa.org/	800-444-6443
Emergency Medical Services for Children	http://www.ems-c.org/	202- 884-4927
TBI Technical Assistance Center	http://www.tbitalac.org/	202-884-6802

To Fall or Not to Fall

Brain Injury in the Elderly

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One of the greatest impediments to the independence and mobility of the elderly is the threat of falling. Falls are themselves a major source of morbidity and mortality in elderly adults, but they also lead to a matrix of consequences that includes progressive loss of mobility, cognitive dysfunction, fractures, and brain injuries. It is important that all doctors who treat older adults be alert to signs of potential brain injury, and be able to offer accurate advice about how to avoid such injuries or manage them if they occur.

Why Do the Elderly Fall?

Loss of balance and proprioceptive sensation, by inhibiting the capacity to react adequately to obstacles and hazards, often causes falls among the elderly. Loss of balance, sometimes considered a part of "normal" aging, is due as much to muscular deconditioning and loss of flexibility as to "aging."

A second important cause of falling is reaction to medications. Most community-dwelling adults older than 65 years of age take between 4 and 10 or more medications every day.¹⁻³ Many commonly prescribed medications—antihypertensives, sedatives, anxiolytics—can, alone or especially in combination, lead to dizziness, drowsiness, and a reduced capacity to react quickly in hazardous situations—thereby leading to falls.

Postural hypotension caused by medication or atherosclerosis increases the risk of falling. Even young, apparently healthy persons who rapidly change position (from lying, sitting, or stooping to standing) can briefly overtax the body's ability to maintain hemodynamic balance. The disorientation and even syncope that results can easily end in a fall.

Finally, an often overlooked risk for falling is having fallen previously. Several studies have found that persons who have

fallen one or more times may become so fearful of falling that subsequent falls actually become more likely.⁴ Postural hypotension or incomplete healing of previous injuries may partially explain this phenomenon, but anxiety about falling and consequent bodily stiffness also play a part.

Falls and Head Injuries

Between 4 and 6% of falls result in broken bones⁵; another 2 to 10% produce soft tissue injuries serious enough to require hospitalization. We are less certain about how often falls lead to brain injuries. Jagger et al,⁶ studying a rural population, found rates of brain injury of 200-250/100,000 persons aged 65 years or more; falls were the predominant cause of brain injury in those over 70, a finding confirmed in other studies.^{7,8} So, although we may not know exactly how often falls lead to brain injury, it is clear that falling is responsible for a large proportion of brain injuries in the elderly.

Brain injuries occurring at any age can be life-changing events, whose effects touch all areas of daily living—thinking, communicating, getting around, taking care of oneself. Family members or other caregivers may be saddled with new and sometimes heavy demands. The cognitive, emotional, and physical impairments of brain injury can make it difficult for the injured person to participate fully in daily activities, and even increase the chance of another fall and further brain injury. The problems caused by brain injury are magnified in older patients by pre-existing cognitive or physical deficits, comorbid diseases, need for medications, or lack of available family support. Often, no caregiver is readily available, or a spouse who is also elderly is pressed into service.

It is controversial whether brain injury increases the risk of Alzheimer's disease. Several studies have reported a statistically significant association of Alzheimer's type dementia with previous brain injury,⁹⁻¹² but other studies have found no such association.^{13,14} In one case-control study,⁹ history of severe brain injury was significantly more common in Alzheimer's patients than in age-matched controls (15% vs 4%, respec-

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tively). But in one of the largest case-control studies published to date,¹³ history of brain injury was no more frequent in Alzheimer's patients than in age- and sex-matched controls.

The question of whether traumatic brain injury increases the risk for Alzheimer's disease remains unresolved, but a related hypothesis suggests that brain trauma hastens the onset of symptoms of Alzheimer's disease in vulnerable persons.^{15,16} Nemetz et al found that severe brain injury significantly reduced the time to onset of symptomatic Alzheimer's disease. Similarly, Gedye et al¹⁵ found that Alzheimer's patients with a history of severe brain trauma before the age of 65 had had the onset of symptoms at an earlier age than Alzheimer's patients with no history of such injury.

If brain trauma is a true risk factor for Alzheimer's disease, how does a brain injury experienced years earlier hasten the onset of the disease? Two explanations have been proposed.^{10,11,15} One is that head trauma with concussion damages the blood brain barrier, leading to loss of immunological protection of brain tissue. The entry of viruses or toxins could produce damage many years after the injury occurred. The other holds that Alzheimer's disease is a manifestation of accumulated, age-related neuronal loss—an inevitable result of very old age. When neuronal loss reaches a critical threshold, symptoms emerge, and events that accelerate that loss, like brain injury or chronic alcohol use, hasten the onset of symptoms.

The Situation in North Carolina

North Carolina has a rapidly expanding population of older adults. In 1990, there were approximately 800,000 people over age 65 in the state; by 2000, the number had risen to 927,000, and by 2020 it is expected to exceed 1.6 million.¹⁷ This rate of growth is nearly triple that of the total population. It is reasonable to expect that the growing elderly population will increase the incidence of specific health problems and the demands on the health care system.

As already noted, we do not have an accurate estimate of the number of head injuries in the population, but the data available give an impression of the scope of the problem and what we might expect in the future. In North Carolina during calendar year 2000, 713 persons aged 65 and over were hospitalized with brain- or head-related injuries. Of these, a small majority were women (57%) and Caucasian (53%). Where cause of injury was recorded, it was most often a fall (42% of cases), followed by motor vehicle crash (13%). These figures doubtlessly underestimate the actual situation because we have no reliable, state-wide data regarding persons seen (but not

Table 1. Symptoms suggestive of brain injury

<i>General symptoms</i>	<i>Cognitive Symptoms</i>
headache	poor attention
fatigue	slowed information processing
daytime sleepiness	short-term memory loss
sleep disturbance	confusion
dizziness	decreased judgement
vertigo	unawareness of deficits
nausea	
incoordination	<i>Affective Symptoms</i>
altered balance	depression
reduced appetite	anxiety
anosmia	irritability
sensitivity to noise and bright light	impatience

hospitalized) in doctors' offices or emergency departments, or those with minor head injuries for which no treatment is sought.

Challenges for the Generalist Clinician

After a blow to the head, most people get up and go on with the day. That is appropriate because most are not significant injuries. Still, some people may (even unknowingly) have had a traumatic brain injury. Such injuries are categorized as mild, moderate, or severe, but all have potentially disabling consequences.

In a few cases, brain injury is so severe that medical attention is immediately and appropriately sought. In other cases, where injury results in subdural hematoma, symptom onset may be delayed for several hours, after which there is a gradual worsening of mental status as the hematoma expands—a condition referred to as "talk and deteriorate." In order to detect such injuries, it is recommended that family members carry out "neurochecks" (for arousability, orientation, and pupil reactivity) every two hours for the first 12 hours after a blow to the head that appears not to have caused serious brain injury. Subdural hematomas are generally caused by falls and are particularly common in the elderly.

In the case of mild traumatic brain injury, the individual may feel dazed or confused, or there may be obscure or delayed symptoms, sometimes attributed to other etiologies. Family members and doctors must maintain a high index of suspicion for brain injury after any blow to the head. Mild traumatic brain injury may lead to one or more of a constellation of physical, cognitive, or affective symptoms, referred to as post-concussive syndrome (PCS) (see Table 1). Signs of head trauma, such as ecchymosis, should trigger a thorough review of systems and an appropriate physical examination, keeping PCS symptoms in mind.

The nature and severity of symptoms determine the diagnostic evaluation and treatment needed. Depending on the

Table 2. Ways to lessen the risk of falling

Minimize tripping hazards
Monitor medications
Exercise moderately
Avoid alcohol
Choose appropriate shoes
Have vision tested

symptoms and findings, it may be appropriate to check the following: blood electrolyte levels, blood counts, thyroid stimulating hormone (TSH) levels, blood levels of prescription or non-prescription drugs, urinalysis and culture, neuro-imaging scans of the head, electroencephalogram, or neuropsychological testing. It may be appropriate to refer the patient to a physiatrist (physical medicine and rehabilitation specialist), or to a neurologist who specializes in brain injury management. General treatment involves education, reassurance, support, and symptom-specific management.

Depression is common after brain injury, and may mimic brain injury by altering cognition and mood. Generally, one of the selective serotonin reuptake inhibitors (SSRIs) like Prozac, Paxil, or Zoloft is used to treat depression after brain injury. They produce a more activating response and have fewer side effects. In addition to medication, counseling may be helpful.

Difficulty initiating sleep can be treated with trazodone, and problems maintaining sleep with amitriptyline. If there is no response to these agents, other medications may be needed, but benzodiazepines should be avoided because they induce general sedation rather than acting on the neurochemical processes that control sleep induction and maintenance.

Post-traumatic headaches are usually musculoskeletal in origin, and can be confirmed through history and physical examination showing posterior myofascial tenderness. These headaches respond well to stretching, massage, acupuncture, correction of predisposing factors like posture, positioning, and activities, the use of non-steroidal anti-inflammatory agents, or a tricyclic antidepressant. When headaches have characteristics of migraine, treatments commonly used for migraine headaches are generally helpful.

Physical, occupational, speech, cognitive, and vocational therapies may help address physical and cognitive deficits. Benign paroxysmal positional vertigo (accompanied by typical physical exam findings) is best treated with specific exercises administered by a specially trained physical therapist. This treatment is preferred over meclizine (Antivert), which may prevent central adaptation. Before the patient resumes driving, a formal driving assessment, available at many rehabilitation hospitals, may be warranted.

Whenever possible, medicines that might complicate the issue or contribute to re-injury by causing confusion, sedation, nausea, dizziness, or orthostasis should be discontinued. Common culprits include the following: anxiolytics, sedative/hypnotics, anti-psychotics, benzodiazepines, anticonvulsants, metoclopramide (Reglan), centrally acting antihypertensive agents (such as clonidine), promethazine (Phenergan), and analgesics.

Medication may be helpful in addressing specific problems. To improve attention, initiative, mood, and memory, stimulating agents such as amantadine (Symmetrel), bromocriptine (Parlodel), methylphenidate (Ritalin), modafinil (Provigil), and donepezil (Aricept) are used.

Much of the advice that can be offered about avoiding brain injury is targeted at reducing the risk of falls (Table 2). We emphasize the importance of careful attention to medications and medication interactions. In addition, a trusting relationship between doctor and patient can provide the basis for advice on prevention strategies that are not explicitly "medical." Patients should be encouraged to minimize the risk of tripping by removing area rugs, and moving electrical cords and other obstacles out of traffic areas. Choice of appropriate footwear is important; shoes should provide good support and have thin, non-slip soles. Slippers and shoes with thick soles (including athletic shoes) should be avoided. Regular, mild exercise can help build and maintain balance and coordination (the practice of Tai Chi may have beneficial effects by improving balance and decreasing falls¹⁸). Vision testing and the provision of strong indoor lighting in the home can help lessen sight-related causes of falls. Alcohol is a common contributor to falls, and limiting or avoiding its use should be discussed. All of these strategies are critical both to the prevention of a first injury, and to the avoidance of re-injury from the cumulative effects of subsequent brain injuries.

Falls, and the brain injuries that can result from them, are serious health considerations for older adults. Sometimes, medical treatment of other health problems may inadvertently contribute to falling. The clinician can play an important role by guiding patients in how to avoid falls, and by recognizing and treating the consequences of brain injuries when they do happen.

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Sports Related Head and Brain Trauma

Frederick O. Mueller, PhD

In 1931 the American Football Coaches Association conducted the first annual survey of football fatalities; since 1965, the data from the annual survey have been collected by the Department of Exercise and Sport Science at the University of North Carolina at Chapel Hill (UNC).¹ In 1977, also through UNC, the National Collegiate Athletic Association began a national survey of catastrophic football injuries. Data from both these research projects have led to important modifications of the sport of football, most notably the rule changes in 1976, the establishment of football helmet standards, improved medical care for players, and better coaching techniques.

With the success of the two football projects, data collection was expanded to include all sports for both men and women, and in 1982 UNC decided to establish a National Center for Catastrophic Sports Injury Research (NCCSIR). The NCCSIR was deemed necessary for several reasons: (1) research based on reliable data is essential to progress in sports safety; (2) there is a paucity of information on injuries in sports of all kinds; (3) there has been a rapid expansion of (and little information about injury in) women's sports. The Center defines as "catastrophic" any severe injury incurred during participation in a school/college sponsored sport. Catastrophic injuries are further classified as follows: Fatal; Non-Fatal but with Permanent Severe Functional Disability; and Serious Injury without Permanent Disability (for example, fractured cervical vertebra with no paralysis).

Sports injuries are also classified as direct or indirect. Direct injuries are those that result directly from participation in the skills of the sport; indirect injuries are those caused by systemic failure as a result of exertion while participating in a sport activity or by a complication secondary to a non-fatal injury. In this paper I will discuss only direct injuries.

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Brain Injury in Sports

Most football fatalities are caused by brain trauma, and fatal brain injury can also occur in other sports, like soccer, wrestling, track, and baseball.³⁻⁵ Traumatic brain injury is common in contact sports (an estimated 250,000 concussions occur every year in football alone⁶). Repeated concussions within a short period can be fatal.^{7,8} Second impact syndrome, in which there is rapid brain swelling and herniation when a second head injury follows a first, occurs when an athlete who has sustained a head injury returns to play or practice before symptoms of the first injury have cleared.

Cantu⁹ states that this is more common than previously thought, and between 1980 and 1991, the NCCSIR identified 29 probable cases in football players alone. For a catastrophic condition with a mortality rate approaching 50% and a near-100% morbidity rate, prevention of second-impact syndrome takes on the utmost importance.⁹

In a recent study, Guskiewicz, et al¹⁰ found that football players who sustained a concussion were three times more likely to sustain a second concussion in the same season than were uninjured players. Recent statistics estimate 300,000 sports-related traumatic brain injuries or head injuries in the United States every year. The Centers for Disease Control and Prevention reports a high incidence of repeated head injuries in several sports, and warns of the likelihood of serious sequelae increases with repeated head injury.¹¹

Football Fatalities

Data on football fatalities have been collected since 1931, but because of uncertainties surrounding early data collection, I report here only the data on football fatalities from 1945 through 2000. Except in 1990, every year from 1945 through 2000 has produced at least one fatal brain injury to participants in high school, college, professional or recreational football. There were a total of 714 football deaths between 1945 and 2000; of these, 492 (69%) were due to brain injuries; 116 (16%) due to cervical spine injuries; and 107 (15%) due to other injuries.

Table 1. Head/brain fatalities in football at all levels of play, 1945–2000

Level of play	Number	Rate*
High school	369 (75%)	0.60
College	34 (6.9%)	0.81
Sandlot	76 (15.5%)	0.68
Professional	13 (2.6%)	5.80
Total	492 (100%)	

*Events/100,000 participants, based on 61,600,000 high school players, 4,200,000 college players, 11,200,000 sandlot players and 224,000 professional players

Table 2. Types of fatal head/brain injuries in football, 1945–2000

Type of injury	Number (% of total)
Subdural hematoma	366 (74.4%)
Brain injury	33 (6.7%)
Fracture	18 (3.7%)
Aneurysm	7 (1.4%)
Unknown	68 (13.8%)
Total	492 (100.0%)

During the period 1945–2000, there were more fatal brain injuries in high school than college football (Table 1), but there were many more high school and middle school football players (about 1,100,000 annually) than college players (about 75,000 annually) so the rate of injury per 100,000 participants is actually lowest for high school football (and vastly higher for professional football).

As might be expected, most of the fatal head/brain injuries in football occurred while the participant was tackling or being tackled in a game. Table 2 shows that approximately 75% of these fatal injuries were subdural hematomas, and an additional 33 were listed as other brain injury. If, as seems likely, the latter were actually subdural hematomas, then this lesion would account for over 80% of all fatal head/brain injuries. A large number of fatal injuries are listed as “unknown type”; if even at least some of them and of those listed as “fracture” were subdural hematomas, it would make this injury the cause of nearly all fatalities.

Figure 1 shows the average yearly number of fatal football head/brain injuries by decade. The rate increased to an all-time high during 1965–1974, then steadily declined through 1985–1994. The decade 1995–2004 is not yet complete, and so it is not certain that the declining trend has been halted; the rate for the first six years (1995–2000) is higher than the rate for the preceding decade. The number of fatalities began rising in the early 1960s and continued into the early 1970s. This can be directly related to the techniques for tackling and blocking that were being taught during those years (characterized by terms like “spearing,” “butt blocking and tackling,” “face to the numbers,” “face in the chest,” etc). Players were told to make initial contact by driving the head and face into the opponent’s chest. Not only did

fatal head/brain injuries increase, but so did fatal cervical spine injuries. The rules changes of 1976 prohibited initial contact with the head or face, leading to a dramatic decrease in both fatal head/brain and cervical spine injuries. Figure 2 shows the rapid

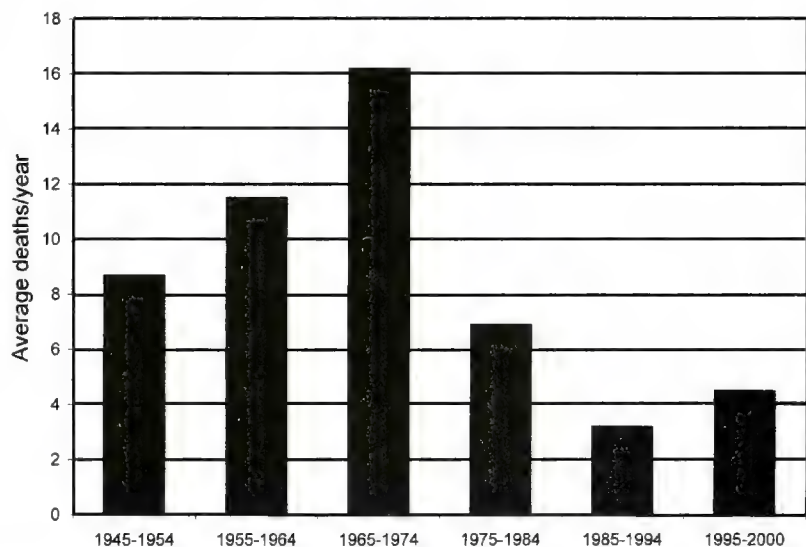


Figure 1. Average yearly number of fatal football head/brain injuries by decade.

rise and fall in fatality rate, peaking in the late 1960s and falling to low levels in recent years.

Catastrophic Football Injuries

In 1977 the National Collegiate Athletic Association initiated an Annual Survey of Catastrophic Football Injuries² (conducted by the University of North Carolina at Chapel Hill as part of the NCCSIR). Catastrophic, non-fatal football injuries are those that result in brain or spinal cord injuries, or head or

spine fractures, and all involve some disability at the time of the injury, but only some produce permanent residual disabilities. At first only data about spinal cord injuries were collected, but beginning in 1984 data from head/brain injuries were included. As shown in Table 3, from 1984 through 2000, 70 high school and seven college-level players suffered catastrophic head/brain injuries. During this same time span, 111 high school and 17 college players sustained spine injuries.

Over the 17 years of data collection, there was an average

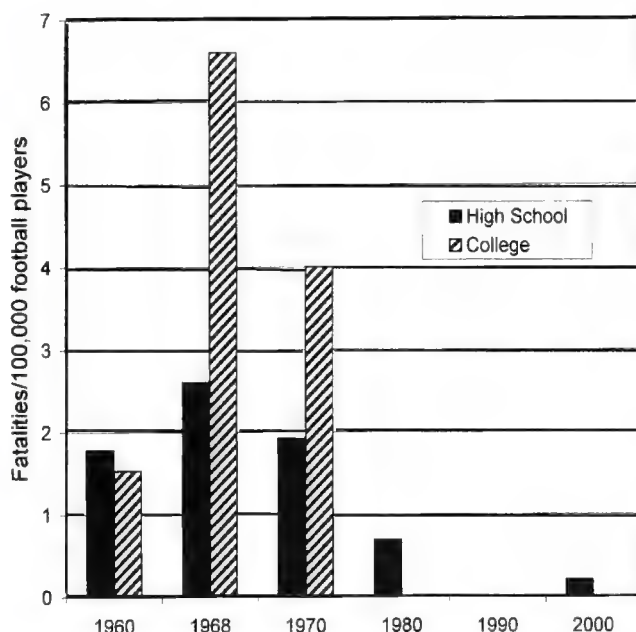


Figure 2. Rate of fatalities from football head/brain injuries.

Table 3. Catastrophic head/brain injuries in football, 1984–2000

Level of play	Number	Rate*
High school	70	0.27
College	7	0.55
Total	77	

*Events per 100,000 participants based on 1,500,00 junior and senior high school players and 75,000 college players annually

of 4.5 catastrophic head/brain injuries/year; in the peak year, 1997, eight players (seven high school and one college player) were injured. The catastrophic head injury rate from 1984 through 2000 is 0.27 injuries per 100,000 high school football players and 0.55 injuries per 100,000 college players. In addition to catastrophic injuries with incomplete recovery, there are a number of serious head injuries each year that end in complete recovery.

Catastrophic Head Injuries in Other Sports

Football has received the most attention with regard to catastrophic athletic injury. In fact, until the formation of the NCCSIR in 1982, football was the only sport with a catastrophic injury data collection system. Table 4 shows ten high school sports that led to catastrophic or severe injuries. Five (track and field, baseball, gymnastics, ice hockey, and cheerleading) had high rates of catastrophic head/brain injuries, but two—gymnastics and ice hockey—attracted relatively small

Table 4. Catastrophic head/brain injuries in high school sports other than football, 1982–2000

Sport	Fatal injury	Rate*	Permanent disability	Rate*	Temporary disability	Rate*	Total	Rate*
Basketball	1	0.01	0	0.0	3	0.02	4	0.02
Track & field	13	0.08	7	0.05	14	0.09	34	0.22
Soccer	2	0.02	1	0.02	4	0.04	7	0.07
Baseball	3	0.04	7	0.09	10	0.12	20	0.25
Softball	1	0.02	0	0.0	1	0.02	2	0.03
Wrestling	1	0.02	0	0.0	0	0.0	1	0.02
Swimming	0	0.0	1	0.03	0	0.0	1	0.03
Cheerleading	1	0.07	1	0.07	11	0.82	13	0.96
Ice hockey	0	0.0	1	0.19	1	0.19	2	0.37
Gymnastics	1	0.22	0	0.0	0	0.0	1	0.22
Total	23		18		44		85	

*Events per 100,000 participants, based on following annual participation numbers for high school men and women: Basketball (1,000,000); Track and Field (850,000); Soccer (550,000); Baseball (450,000); Softball (330,000); Wrestling (230,000); Swimming (200,000); Cheerleading (75,000); Ice Hockey (30,000); Gymnastics (25,000).

numbers of participants, which may have inflated the apparent injury rates.

Pole-vault events produced most of the catastrophic track and field injuries, including three pole-vaulting deaths in 1983, and a number of cervical spine injuries. Pole-vaulting accidents happen in one of three ways: (1) the vaulter bounces out of the landing pit onto the hard surrounding surface; (2) the vaulter misses the landing pit and lands on the hard surrounding surface; (3) the vaulter assumes an upside down position holding onto the pole, is unable to get over the bar, and falls head first into the metal pole planting box. In addition to pole vaulting, track and field produced a number of catastrophic head/brain injuries when participants were struck by a thrown discus, shot put, or javelin. All of these injuries are preventable and should

never happen. Most baseball injuries occur during head-first sliding, collisions with other players, or when players are struck by a pitched or thrown ball. Cheerleading, which has changed dramatically over the past 18 years, now has two distinctive purposes. One is to lead cheers on the sideline, and the other is to compete as highly skilled athletes. Cheerleading accounts for approximately one-half of the catastrophic injuries to high school and college women athletes.

Catastrophic Head/Brain Injuries to Women

There has been an increase in catastrophic injuries to women participants in sports. For example, in 1982-1983 there was one catastrophic injury to a woman, but over the past 17 years there has been an average of 5-6 injuries/year. Half of the injuries occurred during cheerleading; gymnastics ranked second, followed by swimming, basketball, track, softball, field hockey, and volleyball. Table 5 shows the distribution of catastrophic head/brain injuries to women in high school sports from 1982 to 2000. In this group, cheerleading accounted for approximately 70% of

Table 5. Catastrophic head/brain injuries to high school women, 1982-2000

Sport	Fatal injury	Permanent disability	Temporary disability	Total	Rate*
Track & Field	1	0	3	4	0.06
Softball	1	0	1	2	0.02
Cheerleading	1	1	11	13	1.03
Swimming	0	1	0	1	0.06
Basketball	0	0	1	1	0.01
Total	3	2	16	21	

*Rate of total events, based on annual participation in Track (395,000); Softball (350,000); Cheerleading (70,000); Swimming (98,083); Basketball (411,172).

Table 6. Catastrophic head/brain injuries in college sports other than football, 1982-2000

Sport	Fatal injury	Permanent disability	Temporary disability	Total	Rate*
Track & field	2	4	0	6	0.61
Baseball	1	1	0	2	0.56
Basketball	0	0	1	1	0.22
Ice hockey	0	1	1	2	2.78
Cheerleading	1	2	5	8	NA
Total	4	8	7	19	

*Total events per 100,000 participants, based on the following annual participation numbers for college men and women: Track (55,000); Baseball (20,000); Basketball (25,000); Ice hockey (4,000); Cheerleading (unknown).

the head/brain injuries; most athletes recovered from their injuries, but all were serious.

Table 6 shows the distribution of catastrophic head/brain injuries among college athletes participating in sports other than football. The only injuries to women were incurred in cheerleading; one college woman cheerleader died, two were permanently disabled, and four were temporarily disabled but recovered fully. In terms of rate of injury, ice hockey seems to be the most dangerous sport, but the injury rate is based on a single injury among a small number of participants and therefore may be misleading.

Discussion

Recommendations for Preventing Injury. Catastrophic head/brain injuries may never be totally eliminated from sports, but collection and analysis of reliable data about injuries can dramatically lessen injuries. I list here several recommendations for injury prevention:

- ◆ All athletes should undergo a medical examination,

including a thorough medical history, before participating in sports.

- ◆ All schools and colleges that participate in athletics should have on their faculty an athletic trainer who is certified by the National Athletic Trainers' Association.

- ◆ Games rules should be strictly enforced by officials, coaches, and school officials.

- ◆ Coaches should know and be able to teach the proper fundamental skills of the sport.

- ◆ Athletes who have experienced head trauma (loss of consciousness, visual disturbance, headache, inability to walk correctly, obvious disorientation, memory loss) should receive immediate medical attention and should not return to practice or play without appropriate medical clearance. A qualified doctor should observe head-injured athletes for several days after the injury. Coaches should point out why it is important and encourage athletes to inform them of any symptoms (especially those that can't be seen by others, such as headaches).

- ◆ Coaches should never decide whether a player can return to a game or to active practice if that player has experienced brain trauma. The team's certified athletic trainer or a qualified health professional should make that decision.

- ◆ Before participation, both athletes and parents should be warned of the risks of injuries.

- ◆ We must keep the head out of football. Players must be taught to not make initial contact with their head or face while blocking or tackling.

- ◆ The team's certified athletic trainer must be prepared for catastrophic head injuries. Everyone involved must know what to do in advance of any injury. Advance preparation and

knowing what to do may be the difference that prevents permanent disability. Written emergency plans should be available and copies given to all relevant personnel; these plans should cover the following topics: (1) evacuation plans, (2) availability of transportation, (3) portable and open communication, and (4) provision of game/practice schedules to local hospital emergency departments. These recommendations will not prevent injuries from happening, but they may prevent serious injuries from leading to permanent disability.

Conclusions

Data from the NCCSIR have played a major role in reducing the incidence of sports-related catastrophic injuries. National governing bodies have used the data to identify problem areas in specific sports and to implement changes. The ongoing collection of data on catastrophic injuries has allowed these changes to be evaluated. Continuing surveillance is important because sports are evolving and changing, and inexperienced coaches continue to enter the profession. Catastrophic injuries are rare, but, in the unfortunate event of such an injury, health professionals need to be trained and prepared to deal with the situation. And every school should strive for routine and regular access to the services of a NATA-certified athletic trainer.

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What Can We Do About Long-Term Sequelae of Traumatic Brain Injury?

Randall W. Evans, PhD, ABPP

A major issue confronting persons who have experienced traumatic brain injury (TBI), and those associated with their recovery, is preparing and crafting a life beyond the formal rehabilitation phase. Said another way, persons who have had a TBI often find themselves back in their pre-injury environment but unprepared for re-entry to their former lives. Family demands are often more challenging, work demands more difficult, the injured person's psycho-social support system permanently altered. In this article I review the literature pertinent to the functioning of persons with TBI after they have finished the acute medical and rehabilitation aspects of their care and have entered the phase of rehabilitation known as "post-acute and long-term" care.

When we talk about "recovery" from TBI, we first need to establish the severity of the injury. Fortunately, most TBIs are mild and produce few long-term negative consequences. About 75% of all brain injuries fall into this category, and the overwhelming majority of patients resume their pre-injury lifestyles (although some of them do achieve less than optimal recovery¹). The smaller fraction who sustain injuries classified as severe are much less likely to be able to return to their pre-injury lifestyles; in some cases they never return to work, school, or family roles.²

We must then understand that the injured person, regardless of how severe the injury, will spend the much greater portion of his or her life outside of the medical setting. This means that once the patient is discharged from inpatient rehabilitation, health care professionals are likely to "be there" for them only at the time of an acute care event like an emergency room visit, a medication reaction, or a new injury. This does not imply any insensitivity on the part of health care professionals; it is simply the natural sequence that patients—like all of us—return to

their homes and communities to adjust to the events, both positive and negative, that shape their lives. The difference for roughly 2% of the population of North Carolina is just that *the event* is traumatic brain injury.³

Finally, we must realize that the goals and objectives of the post-acute and long-term providers of services for persons with TBI are quite different from those of medical providers who take care of patients on the "front end." For example, emergency services providers seek to establish life support, medical stability, and the beginning of treatment that will maximize the injured person's ability to return to pre-injury level of communication, mobility, and emotional health. Such acute care services are necessary prerequisites to the continuum of care that leads to rehabilitation of TBI. But the goals of the post-acute (out of hospital) health care provider are more global, often focusing on the potential of the injured person to return to work, to school, to their roles as spouse, parent, son, or daughter, and to their position in the community.⁴ To accomplish these goals, the health care professional providing long-term services to the person with a TBI must have a clear appreciation and understanding of his or her abilities, interests, and desires *both before and after* the injury. This turns the focus of treatment away from narrow medical concerns, such as medications, appointments, and surgical procedures, toward overall lifestyle and quality of life.

What Does the Literature Tell Us?

Looking at the medical and research literature on the long-term outcomes of persons who have experienced TBI, it does not take long to see that *medical* issues are far less prominent than *non-medical* concerns. For example, the research literature quite consistently demonstrates that social isolation is one of the most significant hurdles faced by many persons with brain injury,

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particularly those with moderate to severe injury, who often experience slow and gradual loss of interaction with family members, and their pre-injury friends and acquaintances.⁵ As would be the case for anyone, injured or not, loss of support has a major negative impact on quality of life.

I alluded earlier to the "continuum of care" for persons with TBI. This special edition of the *Journal* emphasizes the fact that TBI care is not a simple medical problem but one with major psychosocial, vocational, and family consequences—all of which need attention. The challenges exist long after acute medical interventions are over. A recent edition of the *Journal of Head Trauma Rehabilitation*⁶ illustrates the complex and difficult path that recovery from TBI often takes. The articles in that special issue, which focused upon long-term outcome following TBI, indicate the following:

- ◆ Re-hospitalization is common, occurring in about 23% of cases during the first year after injury and in 17% during the fifth year after injury. Many re-hospitalizations during the first three years are "elective" (for orthopedic and reconstructive surgery), but thereafter re-hospitalization is less likely to be elective and more likely to involve management of seizures, psychological problems, or infections.⁷

- ◆ Studies of persons with TBI demonstrate improved function after rehabilitation, but instruments currently available for documenting such change may not capture the quality of change or the specific nature of those changes.⁸

- ◆ Quality of life after TBI is influenced most by the injured person's mental health status, then by his or her perceived physical health, employment, and leisure status.⁹ Unfortunately, very few programs in the United States focus primarily on long-term quality of life after TBI.

- ◆ Neuropsychological (cognitive) recovery from TBI can take several years. This runs contrary to studies published in the 1980s and early 1990s, which suggested that cognitive improvement reaches a plateau after 12-18 months. The recent study offers more encouragement about the potential for recovery of cognitive function than was earlier perceived.¹⁰

- ◆ Persons who were provided a continuum of care—from acute to post-acute—generally had durable rehabilitation outcomes, maintained for several years after discharge from a formal rehabilitation program.¹¹ Perhaps the most important finding was that even persons with severe TBI continue to make functional gains several years after injury, if they are given appropriate long term care services. This finding was also reported from a study of a large group published several years ago.¹²

- ◆ The families of persons with TBI can have quite complex and demanding needs, even many years after the

injury.¹³ They may need instrumental support (for home and life-style maintenance), emotional support, or support to maintain their own health status, which is at higher risk than in persons who do not have care-giving roles.¹⁴

The Challenges of Life After TBI

TBI can have dramatic, usually negative, effects on vocational options, the ability to live a sustained, independent life, and overall quality of life. The kind of outcome an individual achieves is the result of a very complex interplay of pre-injury issues, such as employment and educational history, injury-related issues like severity of injury, access to a continuum of care, and post-injury issues including family and employer support, and psychological reaction to the injury.¹⁵

There is considerable discussion in the professional and lay community about how persons with TBI "age." Does injury to the brain impose medical and psychosocial vulnerabilities in late life that are avoided by persons without TBI? The literature on this topic is very preliminary, but there are several ongoing research efforts, including those of the Long Term Care Committee of the American Congress of Rehabilitation Medicine and the TBI Model Systems.^{16,17}

The availability of long-term TBI services in North Carolina is less than ideal. The injured person who cannot maintain an adequate quality of life at home, with or without the support of family and friends, has few programmatic options available. The most recent edition of the National Directory of Brain Injury Rehabilitation Services¹⁸ lists only two providers of long-term care for persons with TBI; both are branches of Learning Services Corporation, located in the Raleigh-Durham area. There may be other service providers, for example home based care and extended outpatient services, that are unlisted, but the general consensus within the North Carolina TBI community is that there is a very short supply of long-term, quality-of-life-oriented programs in the state.

Even greater is the need for long-term, post acute services in programs with a neurobehavioral focus, and that serve the clients who are most difficult to manage (persons who are non-compliant with their treatment, at risk for substance abuse, have impulse control problems or life threatening post-traumatic depression). A private, for-profit facility (Learning Services Neuro-Behavioral Institute) recently opened in Creedmoor, NC. It is designed to address this special need. But we still need programs to serve this subgroup of the TBI population who lack the financial backing to pay for this program.

"...TBI care is not a simple medical problem but one with major psychosocial, vocational, and family consequences—all of which need attention. The challenges exist long after acute medical interventions are over."

Summary

It is wrong to think that the needs of persons with brain injury are met or complete in the first few months—or even the first few years—after injury. Some persons with TBI may recover in the acute and out-patient care setting sufficiently to return to home, school, or job, but there is a large group who can greatly benefit from extended care. Extended care can take the form of day activity programs, or respite care for caregivers and injured persons, or supported employment, or home-based services, or long-term residential care. The Commission on Accreditation

of Rehabilitation Facilities has recently established standards of care for “assisted living” to provide guidelines for agencies providing long-term care for persons with various disabilities, including TBI.¹⁹

It is my strong opinion that private and government-based providers must work hand-in-hand to develop and maintain quality, long-term living options for persons with TBI. Such a collaboration, if sustained, would almost certainly give persons with brain injury and their families a much better chance of returning to pre-injury lifestyle or other preferred options.

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The Costs of Traumatic Brain Injury

Karla Thompson, PhD, Al Antony, MD, Adam Holtzman, MStat

In this time of limited resources and escalating health care costs, it is important to understand the "costs" associated with traumatic brain injury (TBI). Existing cost data are quite conservative, and most reports capture only part of the picture. This paper provides an overview of TBI-related costs and describes the limitations of the existing data. Some cost data specific to North Carolina are presented, as well as recommendations as to how we might acquire more comprehensive data regarding TBI.

Estimates of the costs associated with TBI are inextricably linked to the way cases are identified, which in turn generates incidence and prevalence data. There is no national registry for TBI and, at present, most states have no TBI surveillance systems. The Centers for Disease Control and Prevention (CDC) estimate the annual incidence of TBI at 1.5 million cases, with 50,000 deaths and approximately 230,000 hospitalizations each year. Every year, brain injury leads to long-term disability in 80,000 to 90,000 individuals, and a cumulative total of about 5.3 million Americans are currently living with disabilities resulting from brain injury.¹ Staggering as these numbers are, they almost certainly underestimate the true incidence and prevalence of disability due to TBI. In large part, this is because only those persons whose injuries led to hospitalization are counted. The one million people with less severe TBIs who are treated and released from emergency departments each year,¹ and unknown numbers of subjects with mild injuries, go unidentified because they seek outpatient treatment or no treatment at all. The residual impairments associated with mild TBI are generally minimal, but there are data to suggest that a significant percentage of so-called mild injuries lead to persistent and disabling symptoms.²

The financial costs associated with TBI represent the economic burden imposed on individuals, organizations, and societies by injury-related illness, disability, and premature death. Commonly identified costs include the direct costs for medical treatment, rehabilitation, and ongoing care, and the indirect costs of earnings lost to disability and death. The most comprehensive study of TBI-related costs was published in

1991. Using 1984-86 data from the National Hospital Discharge Survey, the National Medical Care Utilization and Expenditure Survey, the National Nursing Home Survey, and the National Council on Compensation Insurance Detailed Claim Information data bases, Max and her colleagues estimated the total annual costs of TBI at \$37.8 billion.³ A 1992 report prepared by Lewin-ICF for the National Foundation for Brain Research updated those figures to 1991 dollars (\$48.3 billion annually).⁴ Charges for acute hospitalization and inpatient rehabilitation accounted for less than 8% of the total, and all medical services constituted only 12%. The remaining 88% represents estimates of wages lost due to death and disability. Disability due to injuries requiring hospitalization accounted for \$31.7 billion in lost wages, and fatalities for another \$16.6 billion. The average lifetime cost per survivor was \$111,578, while the average cost per fatality was \$454,717.

There are reasons to believe that the cost estimates generated by Max et al. and the Lewin-ICF group are low. First, they did not attempt to estimate the costs of injuries that did not result in hospitalization. Second, their data did not include charges for cognitive rehabilitation, neuropsychological services, attendant care, transitional living centers, day treatment programs, supervised living services, community support services, special education services, services provided by friends and family, or insurance administration costs. Third, Lewin-ICF calculations used 1991 dollars. If we use the Consumer Price Index⁵ to translate the Max figures into 2001 dollars, we calculate that annual costs now exceed \$62 billion.

The Costs of Hospitalization

Current data yield wildly disparate estimates of the costs of hospitalization for TBI. The TBI Model Systems Project, a prospective, longitudinal multi-center study funded by the National Institute on Disability and Rehabilitation Research, indicates that acute care costs for treating TBI at Model Systems

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facilities average \$98,612 per case, but the costs of inpatient rehabilitation average \$43,212 (these figures do not include physician charges).⁶ In contrast, Smith and his colleagues report elsewhere in this issue (see page 328) that there were more than 4,800 TBI-related hospitalizations in NC during fiscal year (FY) 2000, with resulting hospital charges of more than \$118 million (about \$25,000/admission). If these figures are complete, they suggest that charges for TBI-related hospitalizations in North Carolina are about one-fourth those generated by admission to Model Systems institutions. Possible explanations for this discrepancy include differences in admission criteria, length of stay, and scope of services. North Carolina's Charlotte Institute of Rehabilitation (CIR) is a new member of Model Systems but has not yet released any cost data. We expect that data from CIR will clarify the extent to which hospital care and associated costs for TBI in North Carolina are consistent with Model Systems standards.

Post-Hospital Care

We have only limited information about the costs of medical services that follow hospitalization for TBI. Max et al reported \$550 million in annual costs for ambulance and helicopter services, prescriptions, physician visits, physical therapy, and nursing home care;³ in 2001 dollars the figure would exceed \$907 million.⁵ Private insurance claims could provide more information, but are difficult to obtain. Publicly funded insurance programs are another source of information.

Medicaid is an entitlement program, jointly financed by state and federal governments and administered by the states. It normally covers charges for inpatient and outpatient hospitalization, physician services, laboratory, x-rays, home health, nursing home, and long-term care facilities for people with disabilities whose incomes fall below poverty levels. In 1981, the Health Care Finance Administration (HCFA) allowed states to develop Medicaid waivers in order to provide long-term and community-based services to people who would otherwise need institutionalization.⁷ In 1996, 36 million of over 225 million (16%) insured individuals were Medicaid recipients.⁸ Data provided by the North Carolina Department of Mental

Table 1. FY 2000 NC Medicaid paid claims by category of service

<i>Service</i>	<i>Dollars</i>	<i>Claims</i>
Ambulance	94,800	455
ER	1,713,400	819
Physician charges	2,383,200	12,167
Inpatient general hospital	23,920,000	940
Crossover services	120,100	40
Inpatient specialty hospital	1,534,200	34
Outpatient general hospital	935,100	1,522
Crossover services	203,300	281
Outpatient specialty hospital	157,100	67
Inpatient state mental hospital	14,700	2
Area MH/SA programs	326,000	104
Skilled nursing and swing beds	3,305,100	91
Intermediate care facilities – state	2,061,000	20
Intermediate care facilities – non-state	2,262,300	158
Home health	1,857,400	228
Personal care	250,200	23
DME	318,100	31
CAP-disabled	1,491,200	32
CAP-MR	2,018,100	48
Cap-children	266,800	3
TOTAL	\$47,128,218	\$17,361

Health, Developmental Disabilities, and Substance Abuse Services indicate that more than \$47 million was paid to cover 17,361 Medicaid claims for TBI-related diagnoses during FY 2000.⁹ Medicaid claims paid for selected categories of service are listed in Table 1. Inpatient medical hospital charges represented more than \$24 million, while outpatient hospital charges were approximately \$1.3 million. Notably, more than \$7.6 million was paid to skilled nursing and intermediate care facilities, more than \$1.8 million for home health care, and more than \$3.5 million for community alternative program (CAP) services. Physician charges (\$2.4 million) were a relatively small part (5%) of the total. There was no information about costs of medication.

Vocational Disability

The costs of medical care and related services for survivors of TBI are enormous, but they are dwarfed by the costs of disability. The CDC estimates that approximately 2% of the US population has some degree of disability due to brain injury;¹ that estimate is likely to be low because it includes only disability due to injuries that resulted in hospitalization. Collateral sources of information regarding vocational disability due to TBI include Social Security, Workers' Compensation claims, and Vocational Rehabilitation.

Social Security Disability (SSDI) and Supplemental Security (SSI) benefits are awarded to eligible disabled persons. Benefit amounts, which are based upon what the recipient has paid into the system during prior years of employment, may serve as proxy measures of income lost to disability. However, the Social Security Administration's (SSA) method of coding impairment is only loosely modeled on diagnostic codes from the 9th Revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM), making identification of specific causes of disability problematic. The ICD-9 codes for intracranial injury with no evidence of skull fracture (codes 850-854) are presumably captured by the SSA impairment code 8540; however, the Office of Research and Statistics for Social Security reports that only 15,447 individuals across the entire country receive SSDI benefits and 7724 receive SSI benefits based on the 8540 impairment code (personal communication from Terri Dodson, Social Security Administration, September 4, 2001). Other SSA impairment codes that might identify cases of TBI do not necessarily match the ICD-9 codes from which they were derived. Approximately 62,807 people currently receive benefits referable to the 9070 impairment code, which the SSA defines as "late effects of injuries to the nervous system." Given the CDC's estimate of 5.3 million Americans with a TBI-related disability, either the SSA's method for coding impairments has no meaningful relationship to the methods used by the medical community, or only a fraction of those with TBI-related disabilities currently receive Social Security benefits.

Workplace injuries and illnesses that result in more than seven lost workdays or in permanent disability are reported to the North Carolina Industrial Commission. Injuries are classified on the basis of damage to various body parts, but ICD-9 codes are not used. Information for FY 1998 provided by the NC Industrial Commission's Office of Statistics indicates that injuries to the head and neck, which may include facial and cervical spine injuries as well as TBIs, resulted in payments for medical care in excess of \$1 million, and compensation for lost earnings in excess of \$2.6 million (personal communication from Linda Kirby, NC Industrial Commission, August 10, 2001). Compensation represents 66% of the worker's salary at the time of injury; thus, there are additional uncalculated costs in lost wages. These figures are based upon a total of 114 *closed cases*, for which costs averaged more than \$22,000/case. It should also be noted that the number of cases closed in 1998 is less than 10% of the number of total ongoing cases (1,995) reported for Fiscal Year 2000.

Vocational Rehabilitation (VR) is a state agency within the Department of Health and Human Services. It is supported by state and federal funds. VR's mission is to help persons with disabilities obtain and maintain employment, and the agency funds a variety of services with that goal in mind. Data provided by VR indicate that in FY 2000 the state agency spent approximately \$965,000 on more than 1,013 North Carolinians with TBI-related disabilities (personal communication from Mike

Massey, Vocational Rehabilitation, August 15, 2001). A large portion of the budget (\$112,000) went to support independent employment for 65 clients. VR also paid approximately \$104,000 for medical, dental, and visual exams, medical reports, medication purchases, medical treatments, dental services, surgeries, and rehabilitation services. Goods and services paid for by VR included rent and utility payments (\$39,000), wheelchairs (\$22,000), vehicle modifications (\$25,000), and transportation (\$29,000). The largest TBI-related expenditure (\$270,000) was for tuition, educational fees, books and school supplies for more than 189 people.

As of April 1, 2001, 477 North Carolina students aged 3-21 years were receiving services under the TBI classification in approximately 250 traditional and charter schools, and in other state-operated school systems such as educational programs in hospitals and prisons (personal communication, NC Board of Education, August 10, 2001). Data regarding the costs of services are maintained by each local education agency (LEA) and have not been tabulated. There is no readily available information about the costs of training teachers to serve this special population, and the North Carolina University system does not track services provided to students with disabilities on the basis of specific diagnoses, so the costs of TBI-related education services remain unknown.

Public Spending

A report published by the Brain Injury Association, Inc., presented data on public spending on TBI for FY 1998.¹⁰ The study focused on federal and state spending for direct services (excluding hospitalization and nursing home placement), prevention, research, and surveillance. Non-public spending (by third-party payers) was not included. Reported expenditures of national public funds (Medicaid, VR, and Health Resources and Services Administration/Maternal and Child Health [HRSA/MCH]) totaled \$195.6 million for 46,341 identified cases; North Carolina spent an estimated \$6.24 million for 1,399 cases (\$3.8 million in federal and \$2.4 million in state funds). However, these numbers are suspiciously low, because NC state and federal Medicaid expenditures were reported to be \$1.1 million for a total of only six cases. Federal and state VR expenditures totaled \$4 million for 1,393 cases, while combined federal and state HRSA/MCH expenditures were \$1 million.

In 2000, the North Carolina legislature allocated \$1.5 million in discretionary funds to the Department of Health and Human Services' Divisions of Developmental Disabilities and Vocational Rehabilitation for TBI-related services and projects (personal communication, Office of Developmental Disabilities, September 21, 2001). The money was distributed to the Brain Injury Association of North Carolina (BIANC) and to community-based case-management, family support, and related services for TBI survivors; \$10,000 was allocated to the BIANC for establishment of a voluntary TBI registry.

A Closer Look: Life Care Plans

The physical, cognitive, and emotional sequelae of TBI vary greatly, even with injuries of similar severity. The resulting impairments and disabilities reflect the interaction of multiple premorbid attributes as well as the injury itself and early medical care. Although aggregate data can be used to estimate the average costs of injury, the true costs associated with any single TBI depend on the needs of the individual. Over the past two decades, Life Care Planning has gained popularity as a way to determine the severity of residual deficits in specific cases, and to estimate the costs of those deficits in terms of future health care needs, personal independence, and employment. Cost estimates use present-day costs, based on an assumption of private pay and non-negotiated rates, with no assumptions about the availability of collateral resources.¹¹ Life care plans are typically developed for attorneys on a fee-for-service basis and are more likely to be generated in cases involving personal injury litigation, but they provide a model for projecting costs that could be applied to any TBI survivor.

Conclusion and Recommendations

More than 5 million Americans live with TBI-related disabilities—an estimate that does not include disability due to injuries not requiring hospitalization. There is little dispute about the huge economic burden of TBI, but even the most frequently cited figures underestimate the true costs. Annual TBI-related costs now may well exceed \$62 billion without including costs of cognitive rehabilitation, neuropsychological services, attendant care, transitional living centers, day treatment programs, supervised living services, community support services, special education, or insurance administration costs. The average lifetime cost of a non-fatal TBI was estimated at less than \$112,000 in 1992, but the current combined costs of just acute hospitalization and rehabilitation at a Model Systems facility exceed this amount. And there are no models for estimating the costs of TBI to families. For those without medical insurance, charges for medical services are passed on to family members and/or society. Families may experience additional lost income when members must leave work to care for injured relatives. Additional costs may be incurred as a result of the survivor's inability to fulfill previous roles like parenting. Finally, family members of TBI survivors develop physical and mental symptoms themselves, the ultimate financial impact of which is unknown.

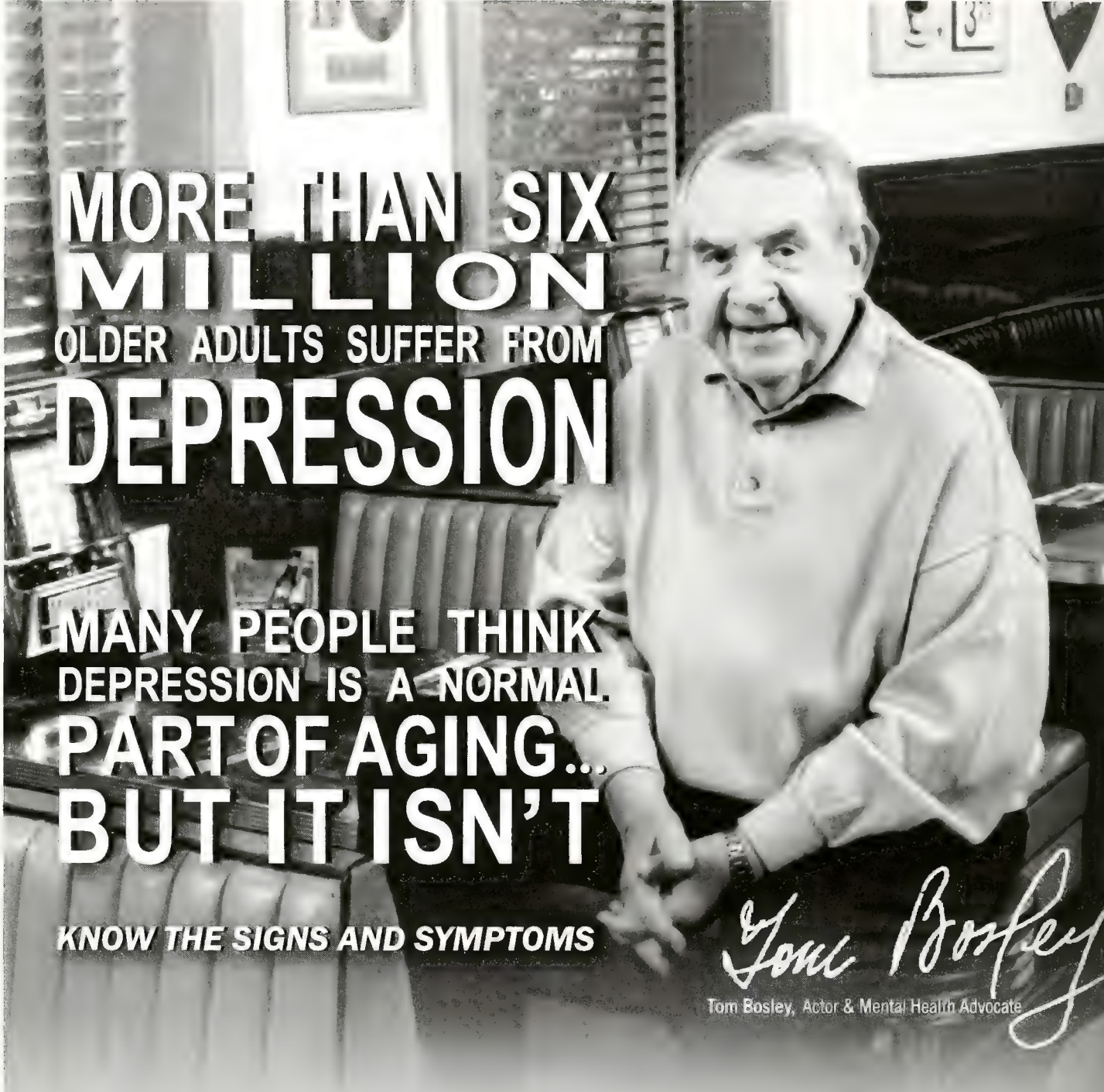
To date, the true incidence and prevalence of disability due to TBI in North Carolina are unknown. The state has no TBI registry, and physicians are not legally required to report TBI. Nonetheless, TBI is clearly a major public health problem. Paid North Carolina Medicaid claims, which probably represent only 15–30% of total medical service claims, amounted to more than \$47 million in FY 2000. Workers Compensation claims for cases closed in FY 1998 were \$3.6 million, but the number of current claims is more than ten times higher than that. Voca-

tional Rehabilitation expenditures approached \$1 million in FY 2000, and the state legislature allocated \$1.5 million for prevention, surveillance, and service-related projects.

Unfortunately, the true financial costs of TBI are probably incalculable. If we are to get any measure of the total impact of TBI, the needs for TBI services, and the success of prevention efforts in North Carolina, the state must develop surveillance systems that identify and track emergency department visits, injuries that do not result in hospitalization, and long-term outcomes. Much of the information needed to develop such a surveillance system already exists in isolated databases like the North Carolina Trauma Registry; the state Regional Advisory Councils (which will include basic Emergency Department information); Premise, an ambulance data base; the Medical Examiner's Office data base; and the state Hospital Discharge data base maintained by the Center for Health Statistics. In addition, VR, Developmental Disabilities, the North Carolina Industrial Commission, the public school and university systems, and even private insurance companies could participate in a coordinated effort to gather accurate data about TBI-related deaths, disability, and service needs. However, none of these agencies is likely to take the initiative in integrating data from multiple sources. In the absence of a legal mandate identifying TBI as a reportable injury, the NC Brain Injury Association may have to lead the way in efforts to generate current, comprehensive, and meaningful data regarding the costs of TBI in North Carolina.

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A black and white photograph of Tom Bosley, an older man with a friendly expression, sitting in a leather-upholstered chair. He is wearing a light-colored, long-sleeved button-down shirt. The background shows a home interior with a window and some framed pictures.

MORE THAN SIX MILLION OLDER ADULTS SUFFER FROM DEPRESSION

MANY PEOPLE THINK
DEPRESSION IS A NORMAL
PART OF AGING...
BUT IT ISN'T

KNOW THE SIGNS AND SYMPTOMS

Tom Bosley
Tom Bosley, Actor & Mental Health Advocate

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CME Calendar

November 8-10

8th Annual Internal Medicine Update & 8th Annual Aging Patient Symposium

Place: Chattanooga Marriott and Convention Center, Chattanooga, TN

Credit: Up to 16.25 hours, Category 1, AMA

Fees: \$575 MDs; \$450 nonMDs

Info: University of Tennessee CME, 975 East Third St., Box 237, Chattanooga, TN 37403. 800/947-7823 x6884; Email: McgheeEA@Erlanger.org.

November 10

Hampton Roads Fall Cancer Conference

Place: The Cavalier Hotel, Virginia Beach, VA

Credit: Up to 7.25 hours, Category 1, AMA

Fee: \$35

Info: Duke Oncology Consortium: 919/419-5500

November 11-15

50th Annual Meeting of the American Society of Tropical Medicine and Hygiene

Place: Hilton Atlanta Hotel and Towers

Credit: Up to 30 hours, Category 1, AMA

Fees: \$200 ACCTMTH members; \$220 ASTMH members; \$370 nonmembers; \$100 students/fellows

Info: Judy DeAcetis, ASTMH, 847/480-9592. Email: astmh@astmh.org. Online: www.astmh.org

November 15-17

Cardiology in Primary Care

Place: J. W. Marriott Hotel, Atlanta, GA

Credit: Up to 18.7 hours, Category 1, AMA

Fees: \$400 MDs, \$300 nonMDs

Info: Emory University CME, 1462 Clifton Rd. NE, Suite 276, Atlanta, GA 30322. 404/727-5695. cme@emory.edu. Online at www.emory.edu/CME

November 17

Lung Cancer: Maximizing Technology and Therapy in the New Millenium

Place: Jordan Hall, U. Virginia, Charlottesville, VA

Credit: 5.75 hours, Category 1, AMA

Fee: \$50 MDs; \$35 others

Info: Camilla Turnage, U. Virginia Office of CME: 434/243-5703; email: cmt4j@virginia.edu. Online: cmevillage.com

December 17-19

Women's Health Conference

Place: New York Hilton, New York

Credit: TBA

Fees: \$450 MDs; \$350 other health professionals; \$200 residents, students, military

Info: World Foundation for Medical Studies in Female Health 516/944-3192. Online: www.wffh.org

March 11-15, 2002

The Alton D. Brashear Postgraduate Course in Head & Neck Anatomy

Place: Virginia Commonwealth University School of Medicine, Richmond, VA

Credit: 43 hours, Academy of General Dentistry

Fees: \$450 MDs; \$300 residents

Info: Dr. Hugo R. Seibel, Dept. of Anatomy, VCU, PO Box 980709, Richmond, VA 23298-0709

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Volume 62: January/February — November/December 2001

Where to locate articles

January/February	pages 1-56	July/August	pages 177-236
March/April	pages 57-112	September/October	pages 237-316
May/June	pages 113-176	November/December	pages 317-383

Author Index

- | | | |
|---|--|---|
| Aldrich, Tim E. Cancer control and the Central Cancer Registry of NC 308 | drome 220 | 19 |
| Cancer control legislation and policy milestones in NC 252 | Buescher, Paul Coronary heart disease and stroke in NC 291 | Curry, Matthew D. Health and social problems of a primary care clinic population after disaster: the Hurricane Floyd flood 99 |
| Alexander, Eben, Jr. The original Siamese twins: we know why Chang died, but why did Eng? 66 | Declining teen birth rates in NC and the US, 1991-98 152 | Demark-Wahnefried, Wendy Prostate cancer as a public health issue in NC 286 |
| Alexander, Joshua Primary care for children with brain injury 344 | Health risks in NC's adult population 64 | Doraiswamy, Murali Depression and vascular function in older adults: evaluating the benefits of exercise in a new study 95 |
| NC's TBI Project ACCESS: assuring coordinated care, education, and support for survivors of pediatric brain injury 359 | Medicaid costs associated with low birth weight 184 | Evans, Randall W. What can we do about long-term sequelae of traumatic brain injury? 373 |
| Alexander, Matthew The charms of music: step by step prescription for patients 91 | Reporting induced abortions in NC 6 | Frino, John Addressing health professions shortage areas in Eastern NC 39 |
| Allison, E. Jackson, Jr. A breathless, bloated young man: superior vena cava syndrome 220 | Butzen, Anne Y. Labored breathing: policies to eliminate environmental tobacco smoke exposure in NC 266 | Fruchtman, Parinda K. <i>Helicobacter pylori</i> : a view from a primary care perspective 198 |
| Anderson, Jean B. Mad dogs, microbes, and other pests, some medical problems in early Durham 154 | Callahan, Beth Traumatic brain injury: state of the state 336 | Fulkerson, Conrad Commentary on Hall article: patient trust 191 |
| Antony, Al The costs of traumatic brain injury 376 | NC's TBI Project ACCESS: assuring coordinated care, education, and support for survivors of pediatric brain injury 359 | Gaither, James Colorectal cancer screening in NC: community physicians' perspective 292 |
| Bartel, Sheri NC's TBI Project ACCESS: assuring coordinated care, education, and support for survivors of pediatric brain injury 359 | Carbone, Elena Prostate cancer as a public health issue in NC 286 | Galanko, Joseph A. Colorectal cancer screening in NC: community physicians' perspective 292 |
| Bobbitt-Cooke, Mary The challenge of eliminating health disparities in NC 19 | Chambliss, M. Lee Office-based preventive care for diabetes 8 | Gardner, Nancy Better Pap tests using liquid based technology 304 |
| Blumenthal, James A. Depression and vascular function in older adults: evaluating the benefits of exercise in a new study 95 | Conlisk, Elizabeth Colorectal cancer in NC: risk factors, screening behaviors, incidence, stage at diagnosis, and mortality 298 | Gierisch, Jennifer What do they know about it? How the NC public views cancer clinical trials: implications for primary care doctors 281 |
| Brown, Charles K. A breathless, bloated young man: superior vena cava syn- | Results from the NC youth tobacco survey: a call to action 256 | Godley, Paul Prostate cancer as a public health issue in NC 286 |
| | Cooper, M. Robert Cancer control and the Central Cancer Registry of NC 308 | Goldstein, Adam O. Labored breath- |
| | Crosby, Melissa A. Colorectal cancer screening in NC: community physicians' perspective 292 | |
| | Curry, Matthew D. The challenge of eliminating health disparities in NC | |

ing: policies to eliminate environmental tobacco smoke exposure in NC			
	266		
Greene, Lisa Poovey Cancer control legislation and policy milestones in NC			
	252		
Gullette, Elizabeth Depression and vascular function in older adults: evaluating the benefits of exercise in a new study			
	95		
Hall, Blaine Paxton Learning the thunder			
	43		
Hall, Mark A Do patients trust their doctors? Does it matter?			
	188		
Hall, Randa Hospital interventions improve care of NC medicare patients with ACI			
	69		
Hammond, Flora M. To fall or not to fall: brain injury in the elderly			
	364		
Hart, Alisha Depression and vascular function in older adults: evaluating the benefits of exercise in a new study			
	65		
Hensel, William A. The education of an educator			
	122		
Herman, Dale Cancer control and the Center Cancer Registry of NC			
	308		
Herman, Steve Depression and vascular function in older adults: evaluating the benefits of exercise in a new study			
	95		
Hinderliter, Alan Depression and vascular function in older adults: evaluating the benefits of exercise in a new study			
	95		
Hodges, Jan S. Recreation therapy can help adult brain injury survivors get back into the community			
	355		
Holtzman, Adam The costs of traumatic brain injury			
	376		
Hooper, Stephen R. Traumatic brain injury: state of the state			
	336		
Training school psychologists in traumatic brain injury: the NC model			
	350		
NC's TBI Project ACCESS: assuring coordinated care, education, and support for survivors of pediatric brain injury			
	359		
Horton, Janet K. Hospice: care when there is no cure			
	86		
Houck, Shawn Office-based preventive care for diabetes			
	8		
Houston, Ann Teen empowerment movement to prevent tobacco use by NC's youth			
	260		
Houston, Michael A 32-year-old man with copious, watery diarrhea			
	34		
Hovis, Scott M. A rare congenital condition discovered (happily) late in life: tetralogy of Fallot with absent pulmonary valve			
	82		
Howard, Brandon Sweet the sound: music in medicine			
	166		
Howard, Cynthia Training school psychologists in traumatic brain injury: the NC model			
	350		
Jefferson, Delmonte Teen empowerment movement to prevent tobacco use by NC's youth			
	260		
Jensen, Brian A 32-year-old man with copious, watery diarrhea			
	134		
Karper, William B Exercise program effects on one woman with multiple sclerosis, Crohn's disease, fibromyalgia syndrome, and clinical depression			
	14		
Keenan, Heather Shaken baby syndrome: lethal inflicted traumatic brain injury in young children			
	340		
Kelley, Meera How close is NC to meeting Medicare's clinical priorities?			
	212		
Keung, Yi-King When medical meets spiritual			
	192		
Khoury, Joseph M. Urinary incontinence: no need to be wet and upset			
	74		
King, Anne NC's TBI Project ACCESS: assuring coordinated care, education, and support for survivors of pediatric brain injury			
	359		
King, Jennifer NC's TBI Project ACCESS: assuring coordinated care, education, and support for survivors of pediatric brain injury			
	359		
King, Anne NC's TBI Project ACCESS: assuring coordinated care, education, and support for survivors of pediatric brain injury			
	359		
Kirk, Denise The challenge of eliminating health disparities in NC			
	19		
Klenzak, Jennifer Colorectal cancer screening in NC: community physicians' perspective			
	292		
Koltai, Deborah Is there an estuary associated syndrome in NC?			
	126		
Koval, Peter B Office-based preventive care for diabetes			
	8		
Krishnan, K. Ranga Depression and vascular function in older adults: evaluating the benefits of exercise in a new study			
	95		
Landau, Steven Do it yourself medical mission: a step-by-step approach			
	140		
Leonardo, Kathleen Health and social problems of a primary care clinic population after disaster: the Hurricane Floyd flood			
	99		
Lincourt, Amy E. To fall or not to fall: brain injury in the elderly			
	364		
Lindsey, Julie Nielsen Emergency contraception: attitudes and practices of primary care doctors in NC			
	158		
Luken, Karen Recreation therapy can help adult brain injury survivors get back into the community			
	355		
Malek, Sally H. Results from the NC youth tobacco survey: a call to action			
	256		
Labored breathing: policies to eliminate environmental tobacco smoke exposure in NC			
	266		
Mansfield, Christopher J. Health and social problems of a primary care clinic population after disaster: the Hurricane Floyd flood			
	99		
The challenge of eliminating health disparities in NC			
	19		
Martin, Jim D. Teen empowerment movement to prevent tobacco use by NC's youth			
	260		
McArdle, Jill How close is NC to meeting Medicare's clinical priorities?			
	212		
McBride, Dennis 2000 Annual report of the state health director			
	30		
McCaskill, Rodney L. A breathless, bloated young man: superior vena cava syndrome			
	220		
McDiarmid, Todd Office-based preventive care for diabetes			
	8		
McLeod, Michael E. Hearing the story: the persisting importance of the history in a technological age			
	119		
Doctor: a person trained in the healing arts			
	78		
Meyer, Robert E. Traumatic brain injury: NC's challenge			
	328		
Mlinar, Kathryn A 32-year-old man with copious, watery diarrhea			
	134		
Moore, Daniel Primary care for children with brain injury			
	344		
Mueller, Frederick O. Sports related head and brain trauma			
	368		
Murray, Sharon C. Colorectal cancer screening in NC: community physicians' perspective			
	292		

Neelon, Francis A. Commentary on Keung article: spirituality and medicine 195	Sealy, Will C. Climbing up the pyramid: my experience as a surgical resident at Duke 45	Sueta, Carla A. Hospital interventions improve care of NC medicare patients with ACI 69
Self perception in anorexia nervosa 233	Shah, Mrugeshkumar K. Helicobacter pylori: a view from a primary care perspective 198	Sullivan, William G. Two neurosurgeons: a bond between Nicaragua and NC 210
These are the times that try 118	Shah, Stephanie H. Helicobacter pylori: a view from a primary care perspective 198	Swinker, Marion Is there an estuary associated syndrome in NC? 126
Editorial 317	Shaheen, Nicholas J. Colorectal cancer screening in NC: community physicians' perspective 292	Tate, David A. Esse quam videre: never more true 104
O'Malley, Michael Colorectal cancer screening in NC: community physicians' perspective 292	Sherwood, Andrew Depression and vascular function in older adults: evaluating the benefits of exercise in a new study 95	Thompson, Karla The costs of traumatic brain injury 376
Pagano, Joseph We want you to know about us! The NC Cancer Control Plan 2001-2006 246	Simpson, Ross J., Jr. Hospital interventions improve care of NC medicare patients with ACI 69	Tillotson, Loyal G. A 32-year-old man with copious, watery diarrhea 134
Palmes, Guy K. Some reflections on the origins of biological psychiatry 224	How close is NC to meeting Medicare's clinical priorities? 212	Torti, Frank What do they know about it? How the NC public views cancer clinical trials: implications for primary care doctors 281
Paskett, Electra D. Colorectal cancer screening in NC: community physicians' perspective 292	Singla, Aneesh Colorectal cancer screening in NC: community physicians' perspective 292	Toulson, Charles A. 32-year-old man with copious, watery diarrhea 134
Prostate cancer as a public health issue in NC 286	Smith, C. Gregory Traumatic brain injury: NC's challenge 328	Veenhuis, Philip E. Traumatic brain injury: NC's challenge 328
Porterfield, Deborah The NC Cancer Control Program: caring for uninsured and low-income patients with cancer 248	Smith, Charles S. A. 32-year-old man with copious, watery diarrhea 134	Walker, William Training school psychologists in traumatic brain injury: the NC model 350
Pothula, Viswandadham Videolaparoscopy in general surgery 205	Sorrell, Vincent L. A rare congenital condition discovered (happily) late in life: tetralogy of Fallot with absent pulmonary valve 82	Watkins, Lana Depression and vascular function in older adults: evaluating the benefits of exercise in a new study 95
Randall-David, Betsy What do they know about it? How the NC public views cancer clinical trials: implications for primary care doctors 281	Sreenivas, Venkatachala I. Videolaparoscopy in general surgery 205	Weiser, Robert How close is NC to meeting Medicare's clinical priorities? 212
Ransohoff, David F. Colorectal cancer screening in NC: community physicians' perspective 292	Stark, Nancy Prostate cancer as a public health issue in NC 286	Wilkins, Jean Is there an estuary associated syndrome in NC? 126
Ribisl, Kurt M. Teen empowerment movement to prevent tobacco use by NC's youth 260	What do they know about it? How the NC public views cancer clinical trials: implications for primary care doctors 281	Wright, Judith C. Cancer control legislation and policy milestones in NC 252
Rose, John D. A rare congenital condition discovered (happily) late in life: tetralogy of Fallot with absent pulmonary valve 82	Stead, Eugene A., Jr. A new way of making doctors: distance learning for non-traditional students 326	Yuriko, Muraki A. Japanese medical student in a medical clerkship program in NC 163
Runyan, Desmond Shaken baby syndrome: lethal inflicted traumatic brain injury in young children 340	Stone-Wiggins, Brenda The NC Cancer Control Program: caring for uninsured and low-income patients with cancer 248	Zook, Betsey Recreation therapy can help adult brain injury survivors get back into the community 355
Sandler, Robert S. Colorectal cancer screening in NC: community physicians' perspective 292	Stopford, Woodhall Is there an estuary associated syndrome in NC? 126	
Sasser, Howell C. To fall or not to fall: brain injury in the elderly 364	Strawcutter, Howard Therapeutic abortion 124	
Schenck, Anna Hospital interventions improve care of NC medicare patients with ACI 69		

Subject Index

Abortion	6, 124	Falling in the elderly	364	Risks, health	64
ACCESS, Project	359	Helicobacter pylori	198	Teen births	152
Acute coronary infarction	69	Hospice	86	Tetralogy of Fallot	82
Anorexia nervosa	233	Hurricane Floyd	99	Tobacco, use among youth	256
Blythe, William B.	104	Low birth weight	184	Environmental smoke	260, 266
Cancer, Prostate	286	History of medicine	45, 119, 154, 224	Traumatic brain injury	328, 336
control in NC	252, 246, 308	at Duke/Durham	154, 45	sports-related	368
colorectal	298, 292	Medical education	9, 163, 326	long-term sequelae of	373
Central Cancer Registry	308	Medical missionaries	140, 210	costs of	376
clinical trials	281	Medicare	69, 212	in children	340, 344
Contraception	158	Music in medicine	91, 166	in the elderly	364
Coronary heart disease	291	Nicaragua	140, 210	recreation therapy and	355
Depression	14	Pap tests	304	Trust between doctor and patient	188, 191
Diabetes	8	Pfiesteria	126	Urinary incontinence	74
Diarrhea	134	Psychiatry, biological	224	Videolaparoscopy	205
Disparities in health care	19	Shaken baby syndrome	340		
Doctoring	119, 78	Shortages in health professions	39		
Epilepsy	43	Siamese twins	66		
Estuary associated syndrome	126	Spirituality and medicine	192, 195		
Exercise, depression and	14, 95	State Health Director	30		
multiple sclerosis and	14	Stroke	291		
crohn's disease and	14	Superior vena cava syndrome	220		
fibromyalgia and	14	Recreation therapy	355		

Letter Index

Alexander, Eben, Jr.	243	Ewing, John A.	244	Saxe, Jessica Schorr	183
Bryan, James A., II	182	Farabow, William S.	116	Shackelford, R.H.	117
Chumney, Elinor	62	Hall, Blaine Paxton	244	Shah, M. K.	243
Cline, J. Steven	320	Henrichs, Charles	320	Smith, J. Baldwin	244
Corbett, Mark	183	Heyman, Albert	116	Smith, Marilyn	321
Corbett, Timothy	244	McClelland, Robert	116, 183	Spudis, Edward V.	5
Dow, Sue	62	James, Robert M.	182	Waldenburg, Leopold M.	244
Dykers, John R., Jr.	5, 243, 321	Rhyne, Jimmie Lee	117	Willson, Charles F.	62
Eddins, George E.	183	Rozear, Marvin P.	183		

Speaking of Medicine

THE BRAIN

The human brain is the most public organ on the face of the earth, open to everything, sending out messages to everything. To be sure, it is hidden away in bone and conducts internal affairs in secrecy, but virtually all the business is the direct result of thinking that has already occurred in other minds.

—*Lewis Thomas, 1974*

Man's brain is his uniquely human organ. Damage it and life loses its meaning in direct proportion, no matter what other physiologic benefits may occur in the process. The brain cannot be regenerated, repaired or homo-transplanted. It accumulates no metabolic debts and, unless supplied continuously by an effective circulation carrying large amounts of oxygen and glucose, it digests itself irreparably. This means that one cannot "let the brain go" while solving other medical problems.... The integrity of the nervous system must be the first goal of therapeutics.

—*Fred Plum, 1971*

If you examine a man [having] a gaping wound in his head, reaching the bone, smashing his skull and breaking open [the viscera] of his skull, you should feel [palpate] his wound. You find that smash which is in his skull [like] the corrugations which appear on [molten] copper in the crucible, and something therein throbs and flutters under your fingers like the weak place in the crown of the head of a child when it has not become whole.

—*[Anonymous], circa 1550 BC*

Although the brain is master of the organs of the body... it is not so placed that it can survive or have any power in the absence of their help.... On the contrary, the animal spirits, and life itself, are so dependent on the continuous supply of blood to the brain, that every... suppression... soon leads to syncope and unconsciousness, and, further, if such processes persist unduly long, the life ceases completely.

—*Richard Lower, 1669*

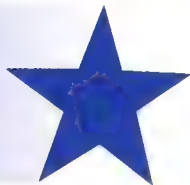
Brain, n. An apparatus with which we think that we think.... In our civilization, and under our republican form of government, brain is so highly honored that it is rewarded by exemption from the cares of office.

—*Ambrose Bierce, 1906*

Index to Advertisers

American Academy of Dermatologists	334
American Academy of Orthopaedic Surgeons	367
Compusystems	back cover
CT Imaging Cooperative, Inc.	324
First Citizens	inside front cover
Mag Mutual	inside back cover
Make A Wish Foundation	383
Mature America	380
MedClick 24/7	325
National Osteoporosis Foundation	343
Physician Solutions	318
Ponce Moody	327
Sabre Capital	322
Sandhill Medical Associates	322
Sky Desk	323
St. Paul Medical	323
Wake Radiology	320

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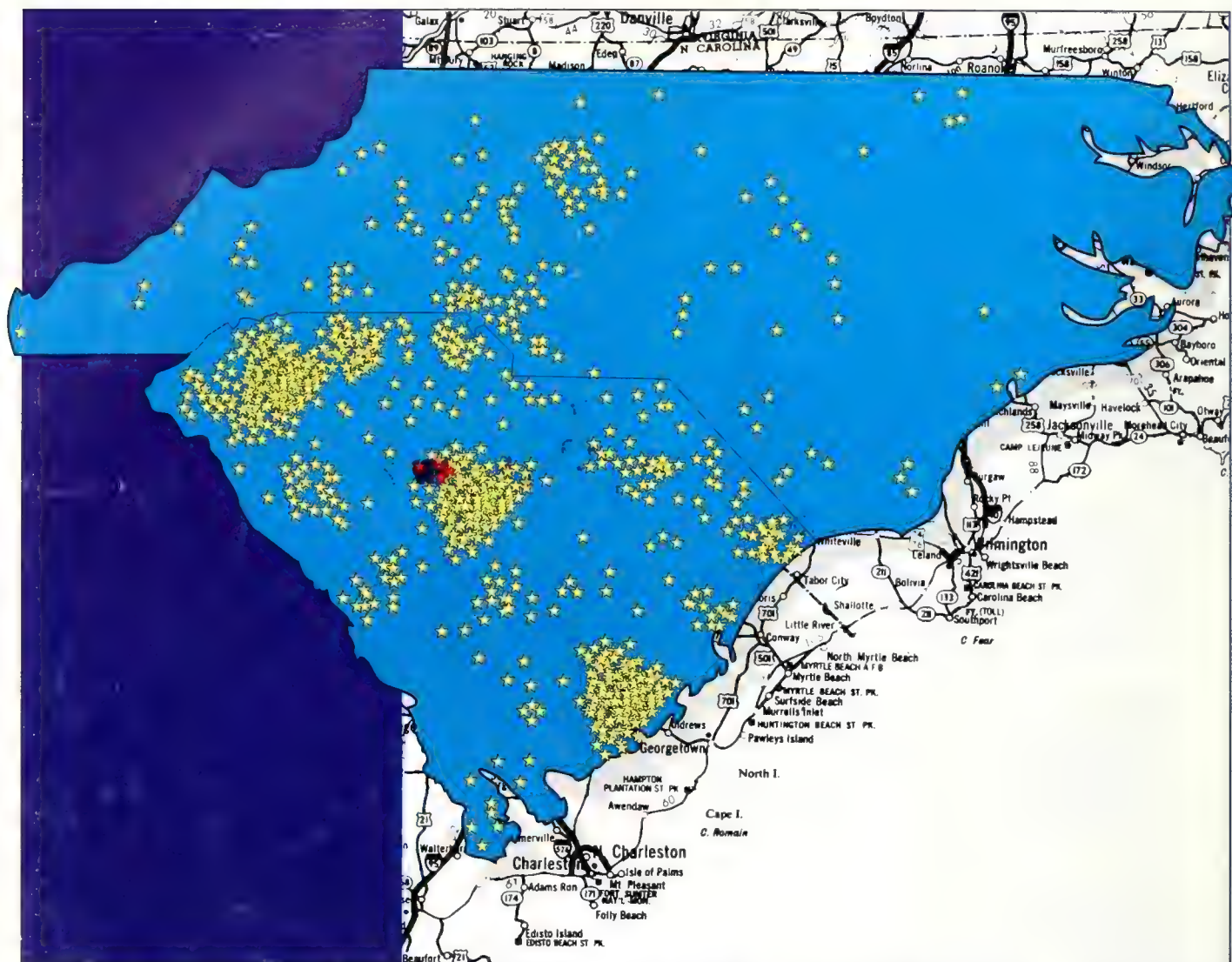
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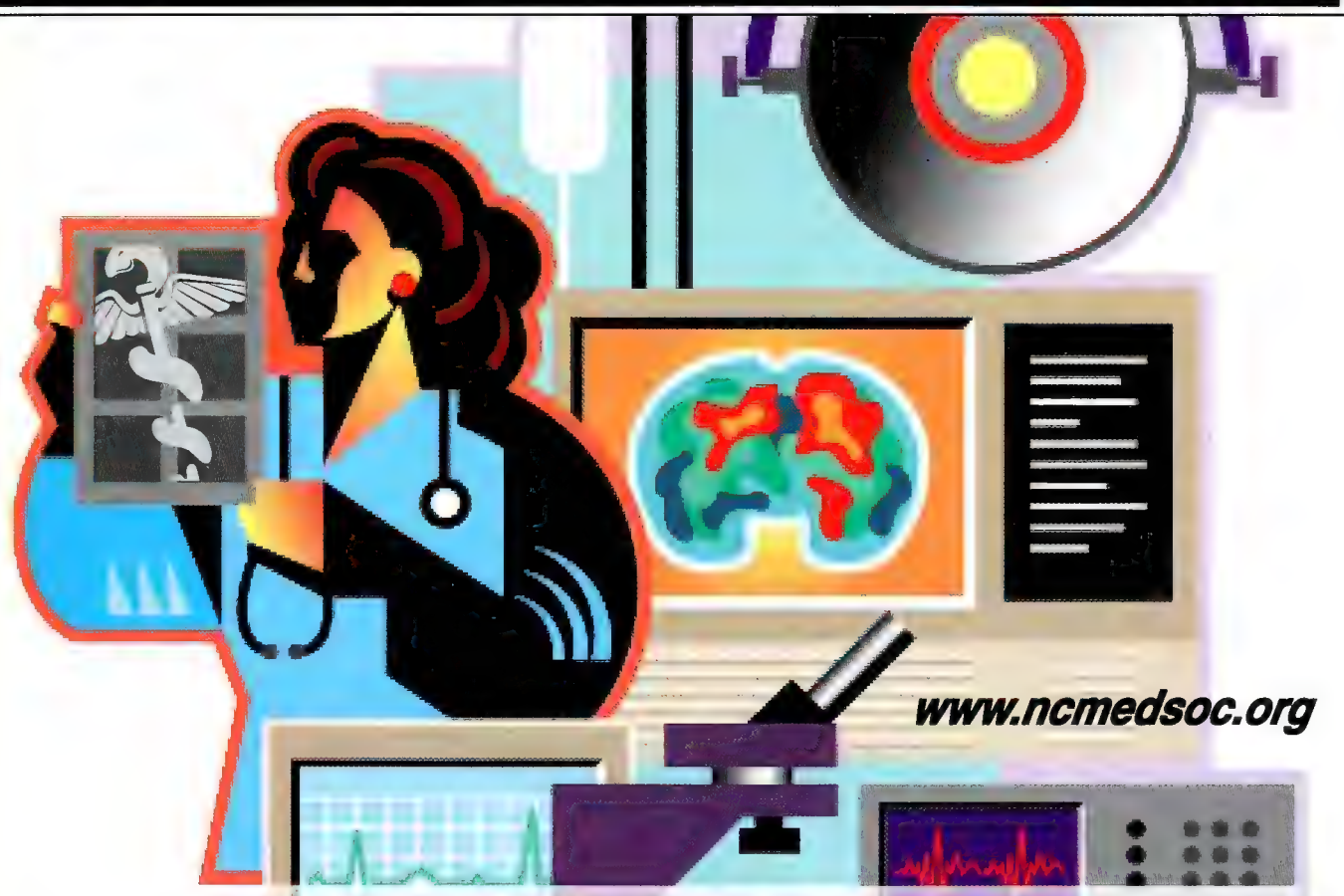
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**A Compilation of
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Committee Members/Chairs**

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2001 MEETING DATES

NCMS Executive Committee April 21, NCMS Headquarters, Raleigh

September 22, NCMS Headquarters, Raleigh

NCMS Executive Council..... April 22, NCMS Headquarters, Raleigh

September 23, NCMS Headquarters, Raleigh

NCMS Committee Conclave March 24-25, Mid Pines Inn, Southern Pines

NCMS Annual Meeting November 8-11, Grandover Resort, Greensboro

AMA June 9-15, Chicago Hilton, Chicago, IL (Annual Meeting)

December 2-5, San Francisco Hilton, San Francisco, CA (Interim Meeting)

March 3-6, Marriott Wardman Park Hotel, Washington, DC (AMA Leadership)

Leadership Roster

North Carolina Medical Society

2001

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CONTENTS

Officers	2
Councilors and Vice-Councilors	2
Delegates to the AMA	3
Alternate Delegates to the AMA	3
Specialty Society Organization Presidents	3
Section Chairs	4
Headquarters Staff Listing	4
Foundation Staff Listing	4
Alliance Staff Listing	4
<i>North Carolina Medical Journal</i> Staff Listing	4
Specialty Coding	5
Committee and Commission Appointments	6
Committee Listing	8
Councilor Districts	16
Boards and Commissions	17
North Carolina Specialty Societies	19
North Carolina Affiliate Organizations	27

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SPECIALTY CODING

A Allergy	FSM Sports Medicine - Family Practice	OTO ... Otolaryngology
ADL Adolescent Medicine	GE Gastroenterology	OTR Orthopedic Surgery-Trauma
ADM ... Addiction Medicine	GER Geriatrics	P Psychiatry
ADP Addiction Psychiatry	GO Gynecological Oncology	PA Clinical Pharmacology
ADP Adolescent Psychiatry	GP General Practice	PAN Pediatric Anesthesiology
AI Allergy & Immunology	GPM ... General Preventive Medicine	PCP Cytopathology
ALD Alcohol & Drug Abuse	GS General Surgery	PD Pediatrics
ALI Allergy & Immunology / Clinical & Laboratory Immunology	GYN Gynecology	PDA Pediatric Allergy
AM Aerospace Medicine	HEM ... Hematology - Internal Medicine	PDC Pediatric Cardiology
AMM .. Administrative Medicine	HEP Hepatology	PDE Pediatric Endocrinology
AN Anesthesiology	HMP ... Hematology/Pathology	PDG Pediatric Gastroenterology
APM Pain Management-Anesthesiology	HNS Head and Neck Surgery	PDI Pediatric Infectious Disease
ARO Adult Reconstructive Orthopedics	HSO Hand Surgery - Orthopedic Surgery	PDO Pediatric Otolaryngology
AS Abdominal Surgery	HSP Surgery of the Hand - Plastic Surgery	PDP Pediatric Pulmonology
ATP Anatomical Pathology	HSS Hand Surgery - Surgery	PDR Pediatric Radiology
BBK Blood Banking / Transfusion Medicine	HYP Hypnosis	PDS Pediatric Surgery
C Cardiology	ICE Cardiac Electrophysiology	PDТ Medical Toxicology - Pediatrics
CBG Clinical Biochemical Genetics	ID Infectious Disease	PDU Pediatric Urology
CCA Critical Care Medicine - Anesthesiology	IG Immunology	PEM Pediatric Emergency Medicine
CCG Clinical Cytogenetics	ILI Clinical/Laboratory Immunology-Internal Medicine	PH Public Health & General Preventive Med.
CCM ... Critical Care Medicine - Internal Medicine	IM Internal Medicine	PHO ... Pediatric Hematology-Oncology
CCN Critical Care Medicine - Neurological Surgery	IMG Geriatric Medicine - Internal Medicine	PIP Immunopathology
CCO ... Critical Care Medicine - OB-Gyn	IND Industrial Medicine	PLI Clinical/Laboratory Immunology-Pediatrics
CCP Critical Care Medicine - Pediatric	ISM Sports Medicine - Internal Medicine	PMD ... Pain Medicine
CCS Critical Care Medicine - Surgery	LM Legal Medicine	PMR Physical Medicine and Rehabilitation
CD Cardiovascular Diseases	MFM ... Maternal and Fetal Medicine	PN Pediatric Nephrology
CDS Cardiovascular Surgery	MFS Maxillofacial Surgery	PO Pediatric Ophthalmology
CFS Craniofacial Surgery	MG Medical Genetics	PORS .. Pediatric Orthopedics
CG Clinical Genetics	MM Medical Microbiology	PP Pediatric Pathology
CHN ... Child Neurology	MO Musculoskeletal Oncology	PPR Pediatric Rheumatology
CHP Child and Adolescent Psychiatry	MSR Musculoskeletal Radiology	PS Plastic Surgery
CLP Clinical Pathology	N Neurology	PSM Sports Medicine - Pediatrics
CMG ... Clinical Molecular Genetics	NEP Nephrology	PTH Pathology
CMP ... Chemical Pathology	NER Neuro Radiology	PTX Medical Toxicology - Preventive Medicine
CN Clinical Neuro-Physiology	NM Nuclear Medicine	PUD Pulmonary Diseases
CNP Clinical Neuro-Pathology	NP Neuro Pathology	PYA Psychoanalysis
CRS Colon and Rectal Surgery	NPM ... Neonatal-Perinatal Medicine	PYG Geriatric Psychiatry
CS Cosmetic Surgery	NR Nuclear Radiology	PYM Psychosomatic Med.
D Dermatology	NS Neurological Surgery	R Radiology
DDL Clinical/Laboratory Dermatological Immunology	NSP Pediatric Surgery - Neurology	REN Reproductive Endocrinology
DIA Diabetes	NTR Nutrition	RHU ... Rheumatology
DLI Diagnostic Laboratory Immunology	OBG Obstetrics and Gynecology	RIP Radioisotopic Pathology
DMP ... Dermatopathology	OBS Obstetrics	RO Radiation Oncology
DR Diagnostic Radiology	OFA Orthopedic-Foot/Ankle	RP Radiological Physics
EM Emergency Medicine	OM Occupational Medicine	SM Sports Medicine
END Endocrinology, Diabetes & Metabolism	OMO .. Orthopedic Musculoskeletal Oncology	SP Pathology, Selective
ESM Sports Medicine - Emergency Medicine	ON Oncology	SRS Spinal Reconstructive Surgery
ETX Medical Toxicology - Emergency Medicine	OPH ... Ophthalmology	TR Therapeutic Radiology
FOP Forensic Pathology	ORAL .. Oral Surgery	TRS Traumatic Surgery
FP Family Practice	ORS Orthopedic Surgery	TS Thoracic Surgery
FPG Geriatric Medicine - Family Practice	OS Other Specialty	U Urology
FPS Facial Plastic Surgery	OSM ... Orthopedic-Sports Medicine	UM Underseas Medicine
FPY Forensic Psychiatry	OSM ... Sports Medicine - Orthopedic Surgery	VIR Vascular and Interventional Radiology
	OSS Orthopedic Surgery of the Spine	VS General Vascular Surgery
	OT Otolaryngology	VS Vascular Surgery

COMMITTEE AND COMMISSION APPOINTMENTS

The committees listed herein have been authorized by President John A. Fagg, MD, and/or as required under the Constitution and Bylaws and the Procedure and Policy Manual. Particular note should be taken of the authorization of the House of Delegates of a commission form of organization activity and that all committees except, COORDINATING COUNCIL OF SPECIALTY SOCIETIES, CONSTITUTION AND BYLAWS COMMITTEE, CREDENTIALS COMMITTEE, EVALUATION COMMITTEE, FINANCE COMMITTEE, COUNCIL ON LONG RANGE PLANNING, MEDIATION COMMITTEE, NOMINATING COMMITTEE are segregated under the respective commission in which the function of the committee logically rests. This will tend to eliminate overlapping and duplication in activity programs and result in coordination of the work of the Society in a manner to lessen the work of the Delegates during the Annual Meeting of the House of Delegates.

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FOUNDATION

About the North Carolina Medical Society Foundation

The North Carolina Medical Society Foundation is the philanthropic, service and outreach arm of the North Carolina Medical Society (NCMS). The NCMS Foundation is a 501(c)(3) charitable organization and contributions to the Foundation are income tax deductible.

The mission of the North Carolina Medical Society Foundation is to *advance the efforts of the NCMS and its members in improving the health status of all North Carolinians by promoting and providing access to quality health care*. The Foundation focuses its efforts on rural, medically underserved and uninsured populations.

Programs of the North Carolina Medical Society Foundation

The Community Practitioner Program

The heart of the NCMS Foundation is its *Community Practitioner Program*. The Community Practitioner Program recruits, supports and retains primary care providers to relieve healthcare manpower shortages and promote access to healthcare in medically underserved areas of North Carolina.

Since the program's inception in 1989, grant funds from the Kate B. Reynolds Charitable Trust have been used to assist 80 North Carolina communities by recruiting, supporting and placing more than 150 primary care providers, many of whom have remained as healthcare providers in the communities in which they were placed, long after the Foundation's support has ended.

The primary physician recruiting tool used is financial support for repayment of medical education loans, typically over a five-year period. Other recruiting and retention incentives may include financial support for moving expenses, practice management and business analysis, and analysis of the community's healthcare infrastructure.

In 2000, the Community Practitioner Program assisted in placing 30 new providers in 30 medically underserved communities in North Carolina. Using

historical data, it is estimated that these 24 physicians, five physician assistants and one family nurse practitioner will provide approximately 238,000 patient visits and deliver approximately \$1.9 million in free care to indigent patients annually.

The Health Care Access Program

The Health Care Access Program works to promote cost-effective models of care for the poor, uninsured and underserved in North Carolina by expanding the capacity of physicians to care for them. Strategies employed for achieving this goal include:

- Providing technical assistance and consultation to community-based ACCESS programs.
- Mobilizing and supporting physicians in expanding successful voluntary care models.
- Studying and developing policy recommendations for systemic changes in the financing and delivery of health care, in order to overcome persistent problems of access to care.
- Promoting and strengthening the role of physicians in the Medicaid program and the physician-managed Carolina ACCESS programs.

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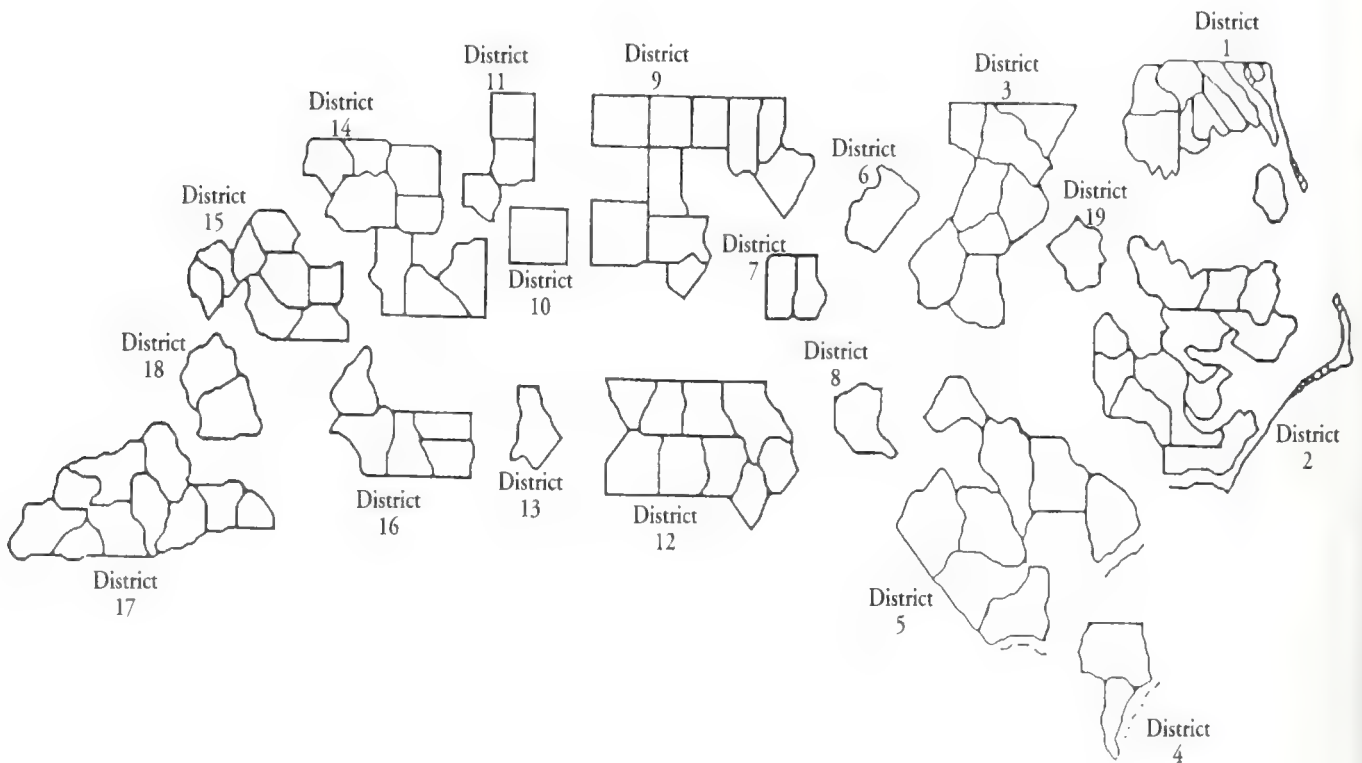
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 (FAX 919-668-7130) (E-Mail: moore048@mc.duke.edu)(www.nccacc.org)
OFFICERS' TERM 3 years
MONTH/YEAR ELECTED March 1999
NUMBER OF MEMBERS 591
ANNUAL MEETING DATE September 28-30, 2001-Grove Park Inn, Asheville
NATIONAL HEADQUARTERS .. American College of Cardiology, 9111 Old Georgetown Road, Bethesda, MD 20814 (1-800-253-4636)
 (FAX 301-897-9745)(www.acc.org)

**NORTH CAROLINA COUNCIL
 OF CHILD & ADOLESCENT PSYCHIATRY**

PRESIDENT Arthur E. Kelley, MD, Department of Psychiatry, WFU School of Medicine, Medical Center Blvd., Winston-Salem 27157-1087 (336-716-2240)
 (FAX 336-716-9642)
 (E-Mail: akelley@wfbmc.edu)
PRESIDENT-ELECT Mark Mattioli, MD, Department of Psychiatry, UNC School of Medicine, CB# 7160, 1st Floor Neurosciences Hospital, 101 Manning Drive, Chapel Hill 27595-7160 (919-966-9913)
 (E-Mail: mmattioli@css.unc.edu)
SECRETARY Lea Kirkland, MD, 1372 Westgate Center Drive, Suite 210, Winston-Salem 27103 (336-659-1151)
 (E-Mail: leakmd@aol.com)
TREASURER Ritz Ray, MD, 3024 Lyndhurst Avenue, Winston-Salem 27103 (336-768-3680)
OFFICERS' TERM 2 years
MONTH/YEAR ELECTED October 1999
NUMBER OF MEMBERS 170
ANNUAL MEETING DATE September 20-23, 2001-Holiday Inn SunSpree Resort, Wrightsville Beach (in conjunction with NC Psychiatric Association)
NATIONAL HEADQUARTERS .. American Academy of Child & Adolescent Psychiatry, 3615 Wisconsin Avenue NW, Washington, DC 20016-3007 (202-966-7300)
 (FAX 202-966-2891)(www.aacap.org)

**CAROLINAS CHAPTER OF THE AMERICAN ASSOCIATION
 OF CLINICAL ENDOCRINOLOGISTS**

PRESIDENT Mark L. Warren, MD, FACE, 620 S. Memorial Drive, Greenville 27834
 (252-752-6101)(FAX 252-830-0558)
 (E-Mail: mwarren@physicianseast.com)
VICE PRESIDENT Usah Lilavivat, MD, FACE, Carolina Diabetes & Kidney Center, 635 W. Wesmark Boulevard, Sumter, SC 29150
 (803-469-7500)(FAX 803-469-7533)
 (E-Mail: slilavivat@ftc-i.com)

NORTH CAROLINA SPECIALTY SOCIETIES

SECRETARY-TREASURER J. Robert Brennan, MD, FACE, 2750 Laurel Street, Suite 206, Columbia, SC 29204 (803-256-3534) (FAX 803-254-7032) (E-Mail: leaendo@aol.com)

EXECUTIVE DIRECTOR W. Alan Skipper, PO Box 27167, Raleigh 27611 (919-833-3836) (FAX 919-833-2023) (E-Mail: askipper@ncmedsoc.org)

OFFICERS' TERM 2 years

MONTH/YEAR ELECTED September 2000

NUMBER OF MEMBERS 84

ANNUAL MEETING DATE September 7-9, 2000-Grove Park Inn, Asheville

NATIONAL HEADQUARTERS .. American Association of Clinical Endocrinologists, 1000 Riverside Ave., Ste. 205, Jacksonville, FL 32204 (904-353-7878)(www.aace.com)

NORTH CAROLINA DERMATOLOGY ASSOCIATION

PRESIDENT Donald D. Fraser, MD, 1901 Brunswick Avenue, Suite 240, Charlotte 28207 (704-377-3299)(FAX 704-376-6644) (E-Mail: docsinn@aol.com)

PRESIDENT-ELECT Laura L. Crow, MD, 2704 St. Jude Street, Greensboro 27405 (336-954-9894)(FAX 336-954-9898) (E-Mail: lacrow@msn.com)

SECRETARY-TREASURER Robert Wade Markham, MD, 1305 Kensington Court, High Point 27262 (336-885-6534)

EXECUTIVE DIRECTOR W. Alan Skipper, PO Box 27167, Raleigh 27611 (919-833-3836) (FAX 919-833-2023) (E-Mail: askipper@ncmedsoc.org)

OFFICERS TERM 1 year

MONTH/YEAR ELECTED November 2000

NUMBER OF MEMBERS 180

WINTER PROGRAM January 12-14, 2001-Pinehurst Resort & Country Club, Pinehurst

ANNUAL MEETING DATE November 10, 2001-Grandover Resort & Conference Center, Greensboro

NATIONAL HEADQUARTERS .. American Academy of Dermatology, 930 N. Meacham Road, Schaumburg, IL 60173 (847-330-0230 or 888-462-3376) (www.aad.org)

NORTH CAROLINA COLLEGE OF EMERGENCY PHYSICIANS

PRESIDENT Maryanne W. Lindsay, MD, FACEP, PO Box 1101, Mt. Airy 27030 (336-786-6068)(FAX 336-789-5495) (E-Mail: mwilindsay@worldnet.att.net)

PRESIDENT-ELECT Tommy Mason, MD, FACEP, 19207 Stableford Lane, Cornelius 28031-8554 (704-896-1868)(FAX 704-896-3156) (E-Mail: tmason17@aol.com)

SECRETARY-TREASURER Charles Brown, MD, FACEP, ECU School of Medicine, 600 Moye Blvd., Greenville 27858 (252-816-4184) (FAX 252-816-5014) (E-Mail: ckbrown@brody.med.ecu.edu)

EXECUTIVE DIRECTOR William N. Hilliard, Jr., PO Box 6524, Raleigh 27628 (919-787-5859) (FAX 919-783-9563) (E-Mail: wnhilliard@aol.com)

OFFICERS TERM 1 year for President
..... 2 years for Secretary-Treasurer

MONTH/YEAR ELECTED October

NUMBER OF MEMBERS 585

ANNUAL MEETING DATE June 8-10, 2001-Holiday Inn SunSpree, Wrightsville Beach

NATIONAL HEADQUARTERS .. American College of Emergency Physicians, PO Box 619911, Dallas, TX 75261-9911 (800-798-1822)

NORTH CAROLINA SOCIETY OF EYE PHYSICIANS & SURGEONS

PRESIDENT Christopher P. Fleming, MD, Western Wake Eye Center, 400 Ashville Avenue, Suite 300, Cary 27511-6134 (919-233-2020)(FAX 919-859-5258) (E-Mail: cpfmd@nc.rr.com)

PRESIDENT-ELECT David D. Markoff, MD, 486 Hospital Drive, Clyde 28721 (828-452-5816)(FAX 828-452-0373) (E-Mail: dmarkoff@pol.net)

VICE-PRESIDENT James H. Antoszyk, MD, Charlotte EENT Associates, 1600 East 3rd Street, Charlotte 28204 (704-358-4135) (FAX 704-945-4143) (E-Mail: jantoszyk@carolina.rr.com)

SECRETARY-TREASURER J. Stuart McCracken, MD, 2609 N. Duke Street, Suite 802, Durham 27704 (919-220-5439)(919-220-6023) (E-Mail: jstuartmc@pol.net)

EXECUTIVE DIRECTOR W. Alan Skipper, PO Box 27167, Raleigh 27611 (919-833-3836) (FAX 919-833-2023) (E-Mail: askipper@ncmedsoc.org)

OFFICERS TERM 1 year, take office in January

MONTH/YEAR ELECTED September 2000

NUMBER OF MEMBERS 300

ANNUAL MEETING DATE September 13-16, 2001 - Hilton Resort, Hilton Head, SC

NATIONAL HEADQUARTERS .. American Academy of Ophthalmology, PO Box 7424, San Francisco, CA 94120-7424 (415-561-8500)(www.eyenet.org)

NORTH CAROLINA ACADEMY OF FAMILY PHYSICIANS

PRESIDENT Maureen E. Murphy, MD, 214 Doctor's St., Sparta 28675-9247 (336-372-5607) (FAX 336-372-6211) (E-Mail: m2md@aol.com)

PRESIDENT-ELECT Robert E. Gwyther, MD, UNC Department of Family Medicine, CB 7595, Manning Drive, Chapel Hill 27599-7595 (919-966-4611) (FAX 919-966-6125) (E-Mail: robert_gwyther@med.unc.edu)

NORTH CAROLINA SPECIALTY SOCIETIES

VICE-PRESIDENT Mott P. Blair, IV, MD, Blair Family Medicine, 404 E. Main Street, Wallace 28466 (910-285-2134) (FAX 910-285-3380) (E-Mail: mblair@coastalnet.com)

SECRETARY-TREASURER Karen L. Smith, MD, FirstHealth of the Carolinas, FFC, 400 Teal Drive, Raeford 28376 (910-904-2350) (FAX 910-904-2351) (E-Mail: smith1@janrix.com)

EXECUTIVE VICE-PRESIDENT .. Sue L. Makey, CAE, PO Box 10278, Raleigh 27605-0278 (919-833-2110 or 800-872-9482-in NC) (FAX 919-833-1801) (E-Mail: smaakey@ncafp.com)

OFFICERS TERM 1 year
..... 3 years for Secretary-Treasurer

MONTH/YEAR ELECTED September

NUMBER OF MEMBERS: 2305

ANNUAL MEETING DATE November 28-December 2, 2001-Grove Park Inn, Asheville

NATIONAL HEADQUARTERS .. American Academy of Family Physicians, 11400 Tomahawk Creek Parkway, Leawood, KS 66211-2672 (913-906-6000)(FAX 913-906-6075) (www.aafp.org)

NORTH CAROLINA INFECTIOUS DISEASE SOCIETY OF AMERICA

PRESIDENT Christopher W. Ingram, MD, 2800 Blue Ridge Road, #219, Raleigh 27607 (919-571-1567)(FAX 919-782-1472) (E-Mail: ingram5@mindspring.com)

PRESIDENT-ELECT Myron S. Cohen, MD, UNC-Chapel Hill, Division of Infectious Diseases, Department of Medicine, CB# 7030, 547 Burnett-Womack Bldg., Chapel Hill 27599-7030 (919-966-2536) (FAX 919-966-6714) (E-Mail: mscohen@med.unc.edu)

SECRETARY-TREASURER Edward N. Robinson, Jr., MD, Moses Cone Health System, 1200 N. Elm Street, Greensboro 27401-1020 (336-832-7000)(FAX 336-832-8026) (E-Mail: enrobinson@aol.com)

OFFICERS TERM 2 years

MONTH/YEAR ELECTED October 2000

NUMBER OF MEMBERS 75

ANNUAL MEETING DATE To be determined

NATIONAL HEADQUARTERS .. Infectious Diseases Society of America, 99 Canal Center Plaza, Suite 210, Alexandria, VA (703-299-0200) (FAX 703-299-0204) (www.idsociety.org)

NORTH CAROLINA COLLEGE OF INTERNAL MEDICINE

PRESIDENT Kevin P. High, MD, Department of Medicine, WFUSM, Medical Center Blvd., Winston-Salem 27157-1042 (336-716-4584) (FAX 336-716-3825)

PRESIDENT-ELECT Johnathan D. Williams, MD, 1896-B Remount Road, Gastonia 28054 (704-865-0626)

GOVERNOR James A. Bryan, II, MD, UNC, CB#7110-Dept. of Medicine, Chapel Hill 27599-7110 (919-966-2268)

GOVERNOR-ELECT Janelle A. Rhyne, MD, 1202 Medical Center Drive, Wilmington 28401 (910-341-3426)

SECRETARY-TREASURER Timothy S. Carey, MD, UNC School of Medicine, CB#7110-Dept. of Medicine, Chapel Hill 27599-7110 (919-966-2276)

EXECUTIVE-DIRECTOR William N. Hilliard, Jr., PO Box 6524, Raleigh 27628 (919-787-5859) (FAX 919-783-9563) (E-Mail: wnhilliard@aol.com)

OFFICERS TERM 1 year

MONTH/YEAR ELECTED February 2000

NUMBER OF MEMBERS 1,700

ANNUAL MEETING DATE February 23-24, 2001-Washington Duke Inn, Durham

NATIONAL HEADQUARTERS .. American College of Physicians-American Society of Internal Medicine, 190 N. Independence Mall West, Philadelphia, PA 19106-1572 (www.acponline.org)

NORTH CAROLINA NEUROLOGICAL SOCIETY

PRESIDENT Michael H. Bowman, PGD, MD, 4207 Lake Boone Trail, Suite 200, Raleigh 27607-6520 (919-782-3456) (FAX 919-420-6076) (E-Mail: mhbneurodoc@mindspring.com)

SECRETARY/TREASURER William H. Hickling, MD, 1910 N. Church Street, Greensboro 27405 (336-273-2511)(FAX 336-370-0287)

EXECUTIVE DIRECTOR W. Alan Skipper, PO Box 27167, Raleigh 27611 (919-833-3836) (FAX 919-833-2023) (E-Mail: askipper@ncmedsoc.org)

OFFICERS TERM 2 years

MONTH/YEAR ELECTED November 1999

NUMBER OF MEMBERS 235

ANNUAL MEETING DATE November 2-4, 2001, Grandover Resort & Conference Center, Greensboro

NATIONAL HEADQUARTERS .. American Academy of Neurology, 1080 Montreal Avenue, St. Paul, MN 55116 (651-695-1940)(www.aan.com)

NORTH CAROLINA NEUROSURGICAL SOCIETY

PRESIDENT C. Scott McLanahan, MD, Carolina Neurosurg & Spine Assocs., 1010 Edgehill Road North, Charlotte 28207-1830 (704-376-1605) (FAX 704-335-8448) (E-Mail: scottmclanahan@cnsa.com)

SECRETARY-TREASURER Bruce Kihlstrom, MD, Durham Clinic, PO Box 15149, Durham 27704 (919-479-4120) (FAX 919-479-4237)

OFFICERS TERM 1 year for President
..... 3 years for Secretary-Treasurer

MONTH/YEAR ELECTED November 1999

NUMBER OF MEMBERS 80+

ANNUAL MEETING DATE November 10, 2001, Grandover Resort & Conference Center, Greensboro

NORTH CAROLINA SPECIALTY SOCIETIES

NATIONAL HEADQUARTERS .. American Association of Neurological Surgeons, 22 South Washington Street, Park Ridge, IL 60068 (708-692-9500)

NORTH CAROLINA OBSTETRICAL AND GYNECOLOGICAL SOCIETY

PRESIDENT H. Alexander Easley, III, JD, MD, 615 E. 12th Street, Washington 27889 (252-975-1188)(FAX 252-975-3800) (E-Mail: seasley@coastalnet.com)

PRESIDENT-ELECT Joel B. Miller, MD, 3720 11th Street, NE, Hickory 28601 (828-322-4140) (FAX 828-322-3767) (E-Mail: jmiller@bluenet.net)

SECRETARY-TREASURER Brenda S. Peacock, MD, Washington Women's Clinic, PA, 614 East 12th Street, Washington 27889 (252-946-9955)(FAX 252-975-6540) (E-Mail: jpeak@iname.com)

SECRETARY-TREASURER ELECT William E. Brown, MD, Greenville Women's Clinic, 2251 Stantonsburg Road, Greenville 27834 (252-757-3131) (FAX 252-757-9600) (E-Mail: gwc@greenvillenc.com)

EXECUTIVE DIRECTOR W. Alan Skipper, PO Box 27167, Raleigh 27611 (919-833-3836) (FAX 919-833-2023) (E-Mail: askipper@ncmedsoc.org)

OFFICERS TERM 1 year
..... 3 years for Secretary-Treasurer

MONTH/YEAR ELECTED April 2000

NUMBER OF MEMBERS 490

ANNUAL MEETING DATE May 3-6, 2001, Grove Park Inn, Asheville

NATIONAL HEADQUARTERS .. American College of Obstetricians and Gynecologists, 409 12th Street, SW, Washington, DC 20090-6920 (202-638-5577)(www.acog.com)

CAROLINAS OCCUPATIONAL AND ENVIRONMENTAL MEDICAL ASSOCIATION

PRESIDENT Alex F. Sanchez, Jr., MD, MPH, 251 Wood Duck Loop, Mooresville 28117 (704-577-2146) (FAX 704-660-6971) (E-Mail: afsanchezjr@worldnet.att.net)

PRESIDENT-ELECT Ron F. Teichman, MD

SECRETARY-TREASURER Douglas H. Adams, MD, 921 Woodbrook Drive, Greensboro 27410 (336-632-1975) (E-Mail: dadams7341@aol.com)

OFFICERS TERM 1 year

MONTH/YEAR ELECTED September 2000

NUMBER OF MEMBERS 213

ANNUAL MEETING DATE September

NATIONAL HEADQUARTERS .. American College of Occupational & Environmental Medicine, 1114 N. Arlington Heights Road, Arlington Heights, IL 60005 (847-818-1800) (FAX 847-818-9266) (www.acoem.org)

NORTH CAROLINA ONCOLOGY SOCIETY

PRESIDENT James F. Boyd, MD, 200 Hawthorne Lane, Charlotte 28233 (704-384-8200)(FAX 704-384-8260)

SECRETARY-TREASURER Keith A. Ayrons, MD, 2563 Pembroke Road, Gastonia 28054 (704-865-5210)(FAX 704-865-6282)

EXECUTIVE DIRECTOR Carol T. Russell, PO Box 33226, Raleigh 27636-3226 (919-467-3818) (FAX 919-467-8099) (E-Mail: ctrussell@mindspring.com)

OFFICERS' TERM 1 year

MONTH/YEAR ELECTED October

NUMBER OF MEMBERS 125

ANNUAL MEETING DATE To be determined

NATIONAL HEADQUARTERS .. American Society of Clinical Oncology, 225 Reinekers Lane, Suite 650, Alexandria, VA 22314 (703-299-0150)(FAX 703-299-1044) (www.asco.org)

NORTH CAROLINA ORTHOPAEDIC ASSOCIATION

PRESIDENT Stephen P. Montgomery, MD, 3515 Glenwood Avenue, Raleigh 27612 (919-781-5600)(FAX 919-782-6578) (E-Mail: smontgomery@raleighortho.com)

PRESIDENT-ELECT J. Marc Kadyk, MD, 194 Doctors Drive, Boone 28607 (828-264-1100) (FAX 828-264-0113) (E-Mail: skadyk@boone.net)

VICE-PRESIDENT Robert T. Wyker, MD, 3515 Glenwood Avenue, Raleigh 27612 (919-781-5600)(FAX 919-782-0416) (E-Mail: rwyker@raleighortho.com)

SECRETARY-TREASURER Stewart J. Harley, MD, 129 McDowell Street, Asheville 28801 (828-258-8800) (FAX 828-258-0416)

RECORDING SECRETARY J. Gregory Nelson, MD, 220 Nash Medical Arts Mall, Rocky Mount 27804 (252-937-9629)(FAX 252-937-8613)

EXECUTIVE DIRECTOR Carol T. Russell, PO Box 33226, Raleigh 27636-3226 (919-467-3818) (FAX 919-467-8099) (E-Mail: ctrussell@mindspring.com)

OFFICERS TERM 1 year

..... 3 years for Secretary-Treasurer

MONTH/YEAR ELECTED October

NUMBER OF MEMBERS 475

ANNUAL MEETING DATE September 28-30, 2001-Holiday Inn SunSpree, Wrightsville Beach

NATIONAL HEADQUARTERS .. American Academy of Orthopaedic Surgeons, 6300 North River Road, Rosemont, IL 60018 (847-823-7186) (FAX 847-823-8125) (www.aaos.org)

NORTH CAROLINA SPECIALTY SOCIETIES

NORTH CAROLINA OSTEOPATHIC MEDICAL ASSOCIATION
PRESIDENT Margaret Nusbaum, DO, MPH, 204
 Parkside Circle, Chapel Hill 27516 (919-966-4612)
PRESIDENT-ELECT Tom Motyka, DO
SECRETARY-TREASURER Kevin Tebrugge, DO, 110 Jefferson,
 Suite 102, N. Wilkesboro
 (336-903-1445)
EXECUTIVE DIRECTOR Janice Stevens (704-442-1535, ext. 10)
 (E-Mail: jms921@aol.com)
OFFICERS TERM 1 year
MONTH/YEAR ELECTED September 1999
NUMBER OF MEMBERS 75
ANNUAL MEETING DATE September 1, 2000-Asheville
NATIONAL HEADQUARTERS .. American Osteopathic Association,
 142 E. Ontario Street, Chicago, IL
 60611 (800-621-1773)(www.aoa-net.org)

**NORTH CAROLINA SOCIETY OF OTOLARYNGOLOGY
 AND HEAD & NECK SURGERY**
PRESIDENT William W. Shockley, MD, UNC, CB#
 7070, 610 Burnett-Womack Bldg.,
 Chapel Hill 27599-7070
 (919-966-3342)(FAX 919-966-7941)
 (E-Mail: shockley@med.unc.edu)
PRESIDENT-ELECT Marcus S. Albernaz, MD, Eastern
 Carolina ENT Head & Neck Surgeons,
 #8 Doctors Park, PO Box 5007,
 Greenville 27835-5007
 (252-752-5227)(FAX 252-757-2824)
 (E-Mail: sualbern@eastnet.ecu.edu)
VICE-PRESIDENT Gregory F. Hulka, MD, 6812 Union
 Grove Church Road, Hillsborough
 27278 (919-684-3220)
SECRETARY-TREASURER P. Bradley Brechtelsbauer, MD, Eastern
 Carolina ENT, Doctors Park, Bldg. #8,
 Greenville 27835 (252-752-5227)
 (FAX 252-757-2824)
EXECUTIVE DIRECTOR W. Alan Skipper, PO Box 27167,
 Raleigh 27611 (919-833-3836)
 (FAX 919-833-2023)
 (E-Mail: askipper@ncmedsoc.org)
OFFICERS TERM 1 year
MONTH/YEAR ELECTED July 2001
NUMBER OF MEMBERS 210
ANNUAL MEETING DATE July 26-29, 2001-Kingston Plantation,
 Myrtle Beach, SC
NATIONAL HEADQUARTERS .. American Academy of Otolaryngology -
 Head & Neck Surgery, One Prince
 Street, Alexandria, VA 22314-3357
 (703-836-4444) (www.entnet.org)

NORTH CAROLINA SOCIETY OF PATHOLOGISTS
PRESIDENT Edward H. Lipford, MD, Carolinas
 Medical Center, Department of
 Pathology, PO Box 32861, Charlotte
 28232 (704-355-3467)
 (FAX 704-355-2156)
 (E-Mail: elipford@carolinas.org)

PRESIDENT-ELECT Keith V. Nance, MD, Rex Hospital,
 Department of Pathology, 4420 Lake
 Boone Trail, Raleigh 27607-7507
 (919-784-3286)(FAX 919-784-3075)
 (E-Mail: keith.vance@rexhealth.com)
VICE-PRESIDENT W. Lawrence Selby, MD, PO Box 1222,
 Dillsboro 28725 (828-586-7130)
 (FAX 828-586-7643)
 (E-Mail: selby1@prodigy.net)
SECRETARY-TREASURER D. Emerson Scarborough, MD, PO Box
 19864, Raleigh 27619 (919-250-8260)
 (FAX 919-250-8232)
 (E-Mail: daemsc@aol.com)
EXECUTIVE DIRECTOR W. Alan Skipper, PO Box 27167,
 Raleigh 27611 (919-833-3836)
 (FAX 919-833-2023)
 (E-Mail: askipper@ncmedsoc.org)
OFFICERS TERM 1 year
MONTH/YEAR ELECTED November 2000
NUMBER OF MEMBERS 217
ANNUAL MEETING DATE November 10, 2001-Grandover Resort,
 Greensboro
NATIONAL HEADQUARTERS .. College of American Pathologists, 325
 Waukegan Road, Northfield, IL 60093
 (800-323-4040)(www.cap.org)

NORTH CAROLINA PEDIATRIC SOCIETY
PRESIDENT William C. Hubbard, MD, 4905
 Professional Court, Raleigh 27609-4968
 (919-872-0250) FAX 919 876-2378)
 (E-Mail: whubb1958@aol.com)
VICE-PRESIDENT Charles F. Willson, MD, Department of
 Pediatrics, Brody School of Medicine at
 ECU, Brody 3E-139, 600 Moye Blvd.,
 Greenville 27858 (252-816-3221)
 (FAX 252-816-2398)
SECRETARY Laura I. Gerald, MD, Lumberton
 Children's Clinic, 400 Liberty Hill Road,
 Lumberton 28358 (910-739-3318)
 (FAX 910-671-3600)
TREASURER Henry C. Hawthorne, Jr., MD,
 Wilmington Children's Clinic, 1920
 South 16th Street, Wilmington 28401
 (910-763-2072)(FAX 910-763-1586)
EXECUTIVE DIRECTOR Steven E. Shore, MSW, 1303 Annapolis
 Drive, Raleigh 27608 (919-839-1156)
 (FAX 919-839-1158)
 (E-Mail: ssncps@attglobal.net)
OFFICERS TERM 2 years
MONTH/YEAR ELECTED September 2000
NUMBER OF MEMBERS 1636
ANNUAL MEETING DATE August 24-26, 2001-Grove Park Inn,
 Asheville
 September 27-29, 2002-Kingston
 Plantation, Myrtle Beach, SC
NATIONAL HEADQUARTERS .. American Academy of Pediatrics, 141
 Northwest Point Blvd., Elk Grove
 Village, IL 60007-1098 (847-434-4000)
 (FAX 847-434-8000)(www.aap.org)

NORTH CAROLINA SPECIALTY SOCIETIES

NORTH CAROLINA SOCIETY OF PHYSICAL MEDICINE AND REHABILITATION

PRESIDENT Daniel P. Moore, MD, Director of
Pediatric Rehabilitation, Brody School of
Medicine at ECU, Department of
Pediatric Rehab and Electrodiagnosis,
Greenville 27858 (252-816-4440)
(FAX 252-816-8108)
(E-Mail: moored@mail.ecu.edu)

VICE-PRESIDENT Patrick P. Carone, MD, Carolina Rehab
Associates, PA, 3000 New Bern Avenue,
Raleigh 27604 (919-350-8779)
(FAX 919-350-8812)
(E-Mail: pcarone@excite.com)

SECRETARY-TREASURER David R. Wierciszewski, MD, Charlotte
Institute of Rehabilitation, 1100 Blythe
Blvd., Charlotte 28203 (704-355-4330)
(FAX 704-355-0709)
(E-Mail: dwierciszewski@carolinas.org)

OFFICERS' TERM 1 year

MONTH/YEAR ELECTED November 2000

NUMBER OF MEMBERS 54

ANNUAL MEETING DATE November 10, 2001-Grandover Resort &
Conference Center, Greensboro

NATIONAL HEADQUARTERS .. American Academy of Physical Medicine
& Rehabilitation, One IBM Plaza, Suite
2500, Chicago, IL 60611-3604
(312-464-9700) (FAX 312-464-0222)
(www.aapmr.org)

NORTH CAROLINA SOCIETY OF PLASTIC AND RECONSTRUCTIVE SURGERY

PRESIDENT W. Byron Barber, MD, PO Box 13800,
Greensboro 27415-3800 (336-275-0919)
(FAX 336-275-4849)
(E-Mail: wbb2md@aol.com)

PRESIDENT-ELECT Kenneth S. White, MD, 2305
Canterwood Drive, Wilmington 28401
(910-343-0119) (FAX 910-343-8983)

SECRETARY Michael R. Zenn, MD, Division of
Plastic Surgery, Duke University Medical
Center, Durham

TREASURER Damon P. Anagnos, MD, 184 Medical
School Wing D, CB#7195, UNC,
Chapel Hill 27599-7195 (919-966-2300)
(FAX 919-966-3814)

OFFICERS TERM 1 year for President, President-Elect &
Secretary
..... 2 years for Treasurer

MONTH ELECTED September

NUMBER OF MEMBERS 115

ANNUAL MEETING DATE September 14-16, 2001-Holiday Inn
SunSpree, Wilmington

NATIONAL HEADQUARTERS .. American Society of Plastic and
Reconstructive Surgeons, 444 East
Algonquin Road, Arlington Heights, IL
60005 (888-4-PLASTIC)
(www.plasticsurgery.org)

NORTH CAROLINA ACADEMY OF PREVENTIVE MEDICINE

PRESIDENT Desmond K. Runyan, MD, Department
of Social Medicine, UNC-CH,
CB#7240, Chapel Hill 27599-7240
(919-962-1136) (FAX 919-966-7499)
(E-Mail: drunyan@med.unc.edu)

NUMBER OF MEMBERS 54

NORTH CAROLINA PSYCHIATRIC ASSOCIATION

PRESIDENT John G. Wagnitz, MD, PO Box 9, West
End 27376-9142 (910-673-9111)
(FAX 910-673-2015)
(E-Mail: neurosis@ac.net)

PRESIDENT-ELECT David A. Ames, MD, 203 Government
Circle, Greenville 27834 (252-413-1811)
(FAX 252-413-1712)
(E-Mail: pvames@coastalnet.com)

VICE-PRESIDENT L. Jarrett Barnhill, Jr., MD, Department
of Psychiatry, CB# 7160, UNC School of
Medicine, Chapel Hill 27599-7160
(919-966-4805) (FAX 919-966-4805)
(E-Mail: jbarnhill@css.unc.edu)

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rhuffman@ncpsychiatry.org)

OFFICERS TERM 1 year for President, President-elect &
Vice-President
..... 2 years for Secretary & Treasurer

MONTH OFFICERS ELECTED .. January/February; take office in May

NUMBER OF MEMBERS 856

ANNUAL MEETING DATE September 20-23, 2001-Holiday Inn
SunSpree Resort, Wrightsville Beach

NATIONAL HEADQUARTERS .. American Psychiatric Association, 1400
K Street, NW, Washington, DC 20005
(202-682-6000 or 888-357-7924)
(FAX 202-682-6850) (www.psych.org)

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OFFICERS TERM 1 year

MONTH/YEAR ELECTED May 2000

NUMBER OF MEMBERS 716

ANNUAL MEETING DATE May 4-6, 2001

NATIONAL HEADQUARTERS .. American College of Radiology, 1891 Preston White Drive, Reston, VA 20191 (800-ACR-LINE)(www.acr.org)

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OFFICERS TERM 1 year

MONTH OFFICERS ELECTED .. June

NUMBER OF MEMBERS 100

ANNUAL MEETING DATE To Be Determined

NATIONAL HEADQUARTERS .. North American Spine Society, 6300 North River Road, Suite 500, Rosemont, IL 60018 (847-698-1630) (FAX 847-823-8668)

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OFFICERS TERM 1 year
..... 3 years for Secretary-Treasurer

MONTH/YEAR ELECTED July 2000

NUMBER OF MEMBERS 650 active members

ANNUAL MEETING DATE July 13-15, 2001-Grove Park Inn, Asheville

NATIONAL HEADQUARTERS .. American College of Surgeons, 633 N. St. Clair Street., Chicago, IL 60611-3211 (312-202-5000)(FAX 312-202-5001) (www.facs.org)

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OFFICERS TERM 1 year

MONTH/YEAR ELECTED October 2000

NUMBER OF MEMBERS 110

ANNUAL MEETING DATE April 26-29, 2001-Pine Needles Lodge & Golf Club, Southern Pines
..... September 27-30, 2001-The Cloister, Sea Island, GA

NORTH CAROLINA THORACIC SOCIETY

PRESIDENT Ralph E. Whatley, MD, Chairman- Department of Medicine, ECU Brody School of Medicine, Brody Bldg., 3E-115, 600 Moye Blvd., Greenville 27858-4354 (252-816-2570) (FAX 252-816-3611) (E-Mail: whatleyr@mail.ecu.edu)

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NORTH CAROLINA SPECIALTY SOCIETIES

OFFICERS TERM 1 year
 MONTH/YEAR ELECTED October 2000
 NUMBER OF MEMBERS 205
 ANNUAL MEETING DATE To be determined
 NATIONAL HEADQUARTERS .. American Thoracic Society, 1740
 Broadway, New York, NY 10019
 (212-315-8700)(FAX 212-315-6498)
 (www.lungusa.org)

NORTH CAROLINA UROLOGICAL ASSOCIATION

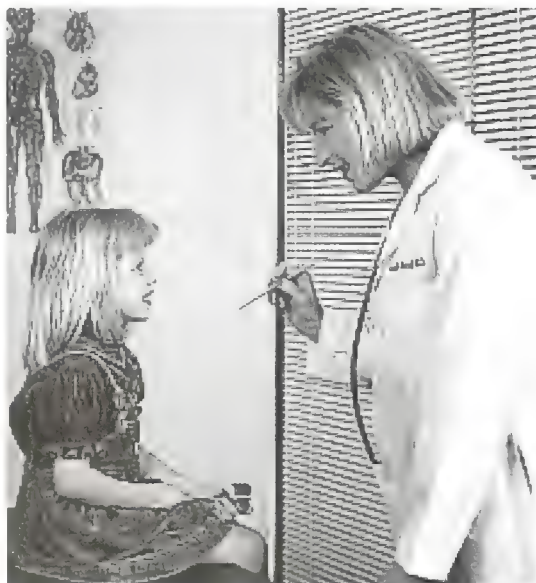
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 (FAX 919-833-2023) (E-Mail:
 askipper@ncmedsoc.org)

OFFICERS TERM 2 years
 MONTH/YEAR ELECTED January 2000
 NUMBER OF MEMBERS 270
 ANNUAL MEETING DATE January 27, 2001-Greensboro-High
 Point Marriott, Greensboro
 NATIONAL HEADQUARTERS .. American Urological Association, Inc.,
 1120 North Charles Street, Baltimore,
 MD 21201 (410-727-1100)
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OFFICERS TERM 2 years

MONTH/YEAR ELECTED October 1999

NUMBER OF MEMBERS 3413

ANNUAL MEETING DATE October 2-5, 2001-Koury Convention Center, Greensboro

NATIONAL HEADQUARTERS .. American Nurses Association, 600 Maryland Avenue, SW, Suite 100 W, Washington, DC 20024 (800-274-4ANA) (www.nursingworld.org)

OLD NORTH STATE MEDICAL SOCIETY

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OFFICERS' TERM: 2 years

MONTH/YEAR ELECTED: June 1999

NUMBER OF MEMBERS: 300

ANNUAL MEETING DATE: June 21-24, 2001-Wilmington Hilton Hotel, Wilmington

NATIONAL HEADQUARTERS: .. National Medical Association, 1012 Tenth Street, NW, Washington, DC 20001 (202-347-1895)

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TREASURER Paul Hendrix, MHS, PA-C, 708 Duluth Street, Durham 27705 (800-922-0312) (NC)

OFFICERS TERM 1 year (January-December)

MONTH ELECTED September

NUMBER OF MEMBERS 1100

ANNUAL MEETING DATE February 25-March 2, 2001-Sheraton Imperial, RTP
..... August 19-24, 2001-Ocean Dunes, Myrtle Beach, SC

OFFICE MANAGER Ashley Prather, 3209 Guess Road, Suite 105, Durham 27705 (919-479-1995 or 800-352-2271)(FAX 919-479-9726) (E-Mail: ncapa.ashley@mindspring.com)(www.ncapa.org)

NATIONAL HEADQUARTERS .. American Academy of Physician Assistants, 950 North Washington Street, Alexandria, VA 22314 (703-836-2272) (FAX 703-684-1924) (www.aapa.org)

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PRESIDENT J. Craig Souza, 5109 Bur Oak Circle, Raleigh 27612 (919-782-3827)

OFFICERS TERM 2 consecutive 1 year terms

MONTH/YEAR ELECTED February 2001

NUMBER OF MEMBERS 386

ANNUAL MEETING DATE February 4-7, 2001-Greensboro

NATIONAL HEADQUARTERS .. American Health Care Association, 1201 L Street, NW, Washington, DC 20005 (202-842-4444)(FAX 202-842-3860) (www.ahca.org)

NORTH CAROLINA AFFILIATE ORGANIZATIONS

NORTH CAROLINA MEDICAL GROUP MANAGERS

PRESIDENT	William D. Zalabak, Jr., FACMPE, Administrator, Mountain Medical Associates, LLP, 600 Hospital Drive, Suite 9, Clyde 28721 (828-452-0331 ext. 233)(FAX 828-456-6100) (E-Mail: wdzjr@primeline.com)
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OFFICERS TERM	1 year
MONTH/YEAR ELECTED	October
NUMBER OF MEMBERS	568
ANNUAL MEETING DATE	Spring: April 4-6, 2001-Wyndum Myrtle Beach Resort, Myrtle Beach, SC Fall: September 12-14, 2001-Sheraton Four Seasons, Greensboro
NATIONAL HEADQUARTERS ..	Medical Group Management Associa- tion, 104 Inverness Terrace East, Englewood, CO 80112-5306 (303-799-1111)(FAX 303-643-4439) (www.mgma.com)

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OFFICERS TERM	1 year
MONTH/YEAR ELECTED	July 2000 (term begins January 1)
NUMBER OF MEMBERS	137
ANNUAL MEETING DATE	July 18-20, 2001

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OFFICERS' TERM	1 year
MONTH/YEAR ELECTED	April 2000
NUMBER OF MEMBERS	1,686
ANNUAL MEETING DATE	May 17-20, 2001, Holiday Inn SunSpree, Asheville
NATIONAL HEADQUARTERS ..	American Association of Medical Assistants, 20 N. Wacker Drive, Suite 1575, Chicago, IL 60606 (312-899-1500 or 800-228-2262)

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SECRETARY-TREASURER	
MONTH/YEAR ELECTED	
NUMBER OF MEMBERS	65

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North Carolina Medical Journal

2001
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For Doctors and Their Patients

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NORTH CAROLINA MEDICAL JOURNAL

For Doctors and Their Patients

2001, Volume 62, Supplement

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NORTH CAROLINA MEDICAL JOURNAL

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North Carolina Medical Journal

FOR DOCTORS AND THEIR PATIENTS

2001, Volume 62, Supplement

Cover: Appropriately for this special supplementary issue on health care in Eastern North Carolina, a winter farm scene in Bertie County, painted by J. Fred Saunders, MD, who has practiced family medicine in Aulander, NC since 1958. (He's now retired except for one day a week, so that he can devote more time to painting.) Our thanks to Dr. Saunders and to the painting's owner, Mr. Peter Rascoe.

Eastern North Carolina A Quarter-Century of Progress in Health Care

Guest Editor: Athanasius A. Anagnostou, MD, FACP

FOREWORD

- S10 A Salute and Personal Farewell to Eastern North Carolina *Athanasius A. Anagnostou, MD, FACP*

CONTRIBUTED ARTICLES

- S20 Demography and Health Care in Eastern North Carolina *Thomas C. Ricketts, PhD, David L. Pope, MHA*
- S26 Primary Care in Eastern North Carolina: Past, Present, and Challenging Future
Christopher Mansfield, PhD, Ralph C. Worthington, PhD, and Matthew D. Curry, MA
- S31 Surgical Services in Eastern North Carolina: A Story of Continuing Evolution
Paul R. G. Cunningham, MD, Ruth Moskop, PhD
- S38 Pediatric Health Care in Eastern North Carolina, 1976-2001 *Jon B. Tingelstad, MD*
- S42 Cardiology in Eastern North Carolina, 1960-2001 *Eric L. Fearrington, MD, FACC, FACP*
- S46 Cancer Care in Eastern North Carolina, 1975-2000 *William F. Bobzien, III, MD*
- S51 Hospital Care in Eastern North Carolina: Responsiveness, Flexibility, and Bottom-Line Finances Keep Rural Centers Vital
Marion P. Blackburn
-

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|-----|----------------------------------|-----|---------------------|
| S6 | Letters to the Editor | S67 | Classified Ads |
| S13 | Letters from the State's Leaders | S68 | Running the Numbers |
| S66 | CME Calendar | | |

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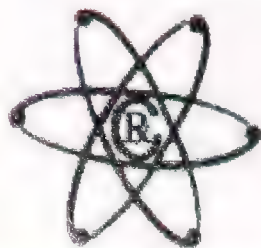
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To our readers:

*A New Look for
The North Carolina Medical Journal*

The North Carolina Medical Society and the North Carolina Institute of Medicine, a public policy research and educational organization created by the North Carolina General Assembly in 1983, are currently considering an arrangement that would result in The Journal being published by the Institute of Medicine on a regular bimonthly basis. The proposed transition in publication responsibility will be formally considered by the NCMS Executive Committee at its meeting in late January. If approved, the new arrangement and format would start in February 2002. Future publications would then be available by subscription only through the Institute of Medicine.

The good news is that, if this proposal is approved by the NCMS, The Journal will continue to be available, as it has been with only limited interruption since its founding by the NC Medical Society in 1849. Moreover, the Institute will bring to The Journal a new dimension as we seek to expand our readership to include all of the health professions and organizations serving the health needs of the people of North Carolina. New features of The Journal will give emphasis to important health and health care issues facing our state, and they will invite our readers to interact with some of the most important public and private sector actors in North Carolina health affairs. We hope you will "stay tuned" and subscribe to The North Carolina Medical Journal in its new format.

If the new arrangement is approved by the NCMS Executive Committee in January, current readers will receive the first issues of the New Year, along with a form for use in subscribing. We think you will consider The North Carolina Medical Journal a "must-read" publication and one well worth the modest subscription price.

Best wishes, and good health, in 2002.
The North Carolina Medical Journal

Letters to the Editor

Where Are the Neurosurgeons?

To the Editor:

I have enjoyed looking at the latest *Journal* [NC Med J 2001;62(6)] but am absolutely amazed that you are able to publish a robust journal with many articles on traumatic brain injury in which not a single neurosurgeon is listed or mentioned. In the bibliography of one paper I did find a reference to a paper by John Jane, who is editor of the *Journal of Neurosurgery* and head of neurosurgery at the University of Virginia. Perhaps another effort could be made in the same tone discussing fractures of the hip and not mentioning or having anything written by an orthopedist.

At any rate the *Journal* is a great journal and I have enjoyed reading it, and I hope you will take this letter with a sense of humor.

I enjoyed reading Gene Stead's "A New Way of Making Doctors." He and I have been good friends for a long time and I disagree somewhat heartily with him on this paper, but still he is a very great person, and has made tremendous contributions to medicine, to Duke, to the *Journal*, and in the establishment of the Physician Assistants program.

Eben Alexander, Jr., MD
Department of Neurosurgery
Wake Forest University Baptist Medical Center
Winston-Salem, NC 27157-1029

New Way? No Way!

To the Editor:

I feel compelled to respond to an article by Dr. Eugene Stead entitled "A New Way of Making Doctors" [NC Med J 2001;62:326-7]. I am a residency-trained board-certified emergency physician practicing in Morehead City, NC. I found the proposal in Dr. Stead's article disturbing, to say the least. He advocates a "new way of making doctors" by allowing midlevel practitioners (physician assistants and nurse practitioners) with "prior knowledge and experience" a "fast-track" way of achieving an MD degree. Dr. Stead suggests that this back-door path to an MD degree will "save them from squandering seven years of precious time." Is that what I did?? Squander seven years of my life?? Were those seven years really that worthless?

Under Dr. Stead's proposed system, the midlevel practitioner would essentially be awarded an MD degree by virtue of real-world experience. I find this irresponsible and insult-

ing to the time-honored successful rite of passage that has created the best clinicians in the world in the best medical system in the world. Many days I wish that I had more than my eight years of medical training. Doing the right thing for every patient every time is difficult business. Why not let flight attendants pilot jumbo jets by virtue of the fact that they have seen pilots do it for years? Between chiropractors, optometrists, nurse anesthetists, nurse midwives, physician assistants, and nurse practitioners, have academic standards in American medicine not been watered down enough? Why go out of our way to make a bad situation worse?

Dr. Stead offers the plight of the patients in underserved areas as the reason to rush "fast-track" physicians through the educational process. Are we suggesting that those patients deserve less? Do we purposefully inflict upon those patients physicians with a fraction of the training of traditionally educated physicians? Hopefully more rational minds will prevail and prevent this dismantling of the educational process in American medicine.

Brian P. Lowry, MD
Medical Director, Emergency Department
Carteret General Hospital
3500 Arendell Street
Morehead City, NC 28557

The author responds:

I appreciate Dr. Lowry taking time to write such a long and thoughtful letter. I am not saying that on-line education is better than the traditional medical school. But it does appear to me that we have a way to test whether the kinds of learning that medical students are expected to get from lectures could be obtained at least as well from distance learning—especially by these students who are already clinically experienced. If the on-line students were admitted to the first and second qualifying examinations along with traditional students, it would be easy to determine how they compared. I believe the on-line students would do better.

Dr. Lowry and I obviously disagree on which is the better method of education. All I am suggesting is that we test out the on-line method, and I will be willing to bet Dr. Lowry my traditional nickel that the on-line program wins out.

Eugene A. Stead, Jr., MD
5113 Townsville Road
Bullock, NC 27507

Education *and* Innovation



Innovative technologies like telemedicine are linking physicians throughout eastern North Carolina. That means patients in many communities can benefit from the expertise of specialists at the Brody School of Medicine and in the private practice community in Greenville.

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By working together, Pitt County Memorial Hospital, the Brody School of Medicine at East Carolina University and private practice physicians make sure our patients get the care they need when and where they need it. Joint programs — like the Heart Center, Leo W. Jenkins Cancer Center and Regional Rehabilitation Center — provide outstanding treatment and prevention services for health problems such as stroke, diabetes and cancer, that are common in this area. And because our partnership includes medical research, many of our patients receive new and effective treatments that are not available everywhere. We're sharing many services and programs with our partners so the expertise and resources here in Greenville are available to citizens throughout our 29-county service area. In the coming months and years, we will continue to expand and improve services in the area. But one thing will never change — our dedication to the well being of people in eastern North Carolina.


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A Salute and Personal Farewell to Eastern North Carolina

Athanasios A. Anagnostou, MD, FACP, Guest Editor

In January 1994, my wife, Linda Pololi, and I left Brown University to join the East Carolina University (ECU) School of Medicine in Greenville, NC. I began the rebuilding of a Hematology/Oncology program decimated after the untimely death of its founding director, Spencer Raab; Linda helped with school-wide curriculum and faculty development. Originally from Greece and England, we had lived for 20 years in Chicago and Providence, RI, but never before in the South. We, like most of ECU's faculty, came because we saw how much could be done to improve the health of citizens in this critically under-served area. This rural medical school was the only center in the region with the opportunity and mission to facilitate this improvement. Successful programs developed at ECU could serve as models for others.

The notable southern historian W.J. Cash noted over half a century ago that the South is more a state of mind than a physical entity, that it defines itself largely through attitudes about family, religion, and a reluctance to move (partly because of the strong belief in the family). The attachment to family and place is strong in rural areas¹ and exceptionally prominent "Down East." A local newspaper described it this way: "Eastern North Carolina is a region of small, isolated communities. Agriculture still dominates most economies, and its routines influence community life. Hard work and strong ties to family are common values. But the rural nature of the region and the persistent high levels of poverty mean there are few dollars for resources like schools, health care, four-lane highways, public safety—and, yes, recovery from a devastating natural disaster."²

Dr. Anagnostou was Professor of Medicine and Chief of Hematology/Oncology at ECU's Brody School of Medicine from 1994-2001. He is now Professor of Medicine and Director of Clinical Services, Planning and Outreach, at the University of Massachusetts School of Medicine Cancer Center. He may be reached at 119 Belmont St., Room AC292a, Worcester, MA, 01605. Email: Anagnostoua@ummc.org.

The Health Care Needs of Eastern NC

In this supplementary number of the *North Carolina Medical Journal*, the invited contributions by Mansfield et al and by Ricketts and Pope describe in detail the great health disparities that still exist in eastern North Carolina despite remarkable progress over the last few decades. There are still enormous social, economic, cultural, educational and institutional barriers to good care. Economic barriers—the cost of transportation, insurance, lost wages, co-payments, HMO costs—are especially important. A detailed British study of the relationship between wealth and health described the difference between affluent and poor areas in health care coverage and access (with its impact on life expectancy).³ Rural patients suffer the financial penalty of having to travel large distances, and this is compounded by the social and emotional deprivation caused by separation from home and friends. The 1998 Dartmouth Atlas of Health Care says that "in health care, Geography is Destiny." Access to health care is inversely related to distance;⁴ the farther away a resource is, the less likely that an individual will use that resource.⁵

The Reason for a Special Issue

The idea of a special issue of the *Journal* devoted to changes in health care in eastern North Carolina over the last quarter century sprang from my interactions with colleagues and legislators in the rest of state. There is widespread appreciation of the poverty and generally poor health of the region's population. However, there is too little awareness of the almost heroic struggle by health care professionals, hospital administrators, and county health department directors; the support of their efforts by state agencies and the legislature over the last few decades; and the spectacular progress in health care that has been the result. My hope is that this issue will not only remind us of the great needs of the region

and its deserving people but will also honor the extraordinary efforts of many remarkable individuals. It is important to remember that 30 years ago there was almost no access to even basic health care in much of the eastern part of the state. Since then, many true heroes have worked quietly but passionately to bring about desperately needed change. Their example and work should inspire new generations to continue in the spirit of those pioneers and visionaries. People should know the names of Drs. Andrew A. Best of Greenville, John Jacob Hannibal, Jr. of Kinston, Joseph Weaver of Ahoskie, and Milton Quigless of Tarboro—black family doctors who, practicing even before the civil rights movement got underway, made immense strides in health care and social justice for their communities.

State legislators should be reminded of the great benefits that the ECU School of Medicine (recently renamed Brody School of Medicine) brought to the region, and should be reassured that the funds from the public purse given to underwrite the school have been a good investment.

The solicited letters enclosed in this issue demonstrate to the voting populace the constant attention and commitment of the state legislature and especially of the representatives from eastern NC to the unique problems of the region.

To realize this issue, I asked several colleagues, noted for their knowledge of regional health care efforts as well as their own singular contributions over time, to briefly describe the changes they have seen over the last quarter century in their respective specialist areas. These invited contributions could not, nor were they intended to, be comprehensive or historically systematic, but I hope they may catalyze a more thorough accounting and inclusive perspective. In fact, Dr. Paul Cunningham, in his role as President of the Pitt County Medical Society, has already recruited colleagues across the region to start audio/videotaping the recollections of many of Eastern North Carolina's surviving medical protagonists.

Marking Out a Better Future

Good health underlies social, economic, community, and personal development. Despite this issue's celebration of the great progress accomplished, many residents of eastern NC still get only episodic care. Community services are fragmented and the full range of specialist services are often unavailable. A great value of good medical care is in the maintenance of public morale. Culturally sensitive, competent, adequate, and affordable medical care gives confidence to the community to invest in its future. Large health care systems also function as economic locomotives for their area, as has definitely been true for Greenville and its environs.

But we still have an immense task in ensuring the availability of coherent health care services—from prevention through primary care and screening services, from

diagnosis to treatment, rehabilitation, and palliative care. We need to keep in mind throughout that health care is primarily a local product and that rural health care is not miniature urban health care. It is critical that we have community planning and involvement in health care decisions and the setting of local healthcare priorities. We need health care delivery systems that integrate local resources and are "rurally sensitive" (e.g., that do not impose excessive burden of travel). Only by working collaboratively with all stakeholders can we take forward this vision. The nation saw in action the collaborative spirit of east Carolinians during the terrible floods of Hurricane Floyd in September 1999, but this spirit lives every day in these small rural communities. Eastern NC is the sum of the possibilities of its people—infinite possibilities, as long as there is continued interest and investment by the state and a coordinated and well-thought out plan for regional development.

ECU and its medical school, by virtue of mission, location, and admirable track record, have been and will continue to be looked to for leadership and assistance. Many large universities are moving beyond the traditional roles of teaching, research, provision of highly specialized services, and care of vulnerable populations, to involve their faculty in a broad range of human associations both on and off campus. Judith Rodin, President of the University of Pennsylvania, refers to this new movement away from the customary "town-gown" squabbles in an op-ed article in the *New York Times*: "Universities have broken out of the confines of their campuses to take a greater role in building the communities around them, creating a relationship that is not only less contentious but collaborative. . . . Those who don't are neglecting their duties as institutional citizens and missing a chance to help themselves and secure their own future..."⁷⁶

ECU is ideally positioned for such a social mission beyond its role as creator of knowledge, educator of young minds, transmitter of culture, source of entertainment (through its sports programs), and major agent of regional economic growth. It has deservedly earned the affection and respect of the region's citizens and is richly endowed in the "social capital"⁷⁷—networks and social values that encourage cooperation—that will allow it to take risks and be innovative. For example, a major challenge in rural care is the difficulty in recruiting and retaining doctors, particularly specialists, in rural settings. A number of solutions have been proposed: decent incomes, flexible schedules, opportunities for continuing medical education, for career development and clinical research, and provision of *locum tenens* coverage of the rural practice by medical school-based faculty.^{8,9} In fact, we succeeded in implementing these suggestions in the course of establishing oncology programs in many counties, by collaborating with local hospitals and medical practitioners. There is no reason that our example cannot be duplicated for other needed services.

A Great Many Thanks on Leaving Eastern North Carolina

Eastern North Carolina has given me and my family a wonderful journey. We leave the region enriched with friends, experience, a sense of accomplishment, admiration for the character and talents of innumerable colleagues, and fond memories of a wonderful climate, a magnificent coast and storied mountains, and a gentle and caring and hospitable populace. We are full of gratitude for all that ECU, the region and its people, offered us so generously, but some folks deserve my very special thanks. I thank the faculty and staff of Hematology and Oncology for their unwavering personal support, and especially their incredible passion and sustained hard work, undertaken without thoughts of personal recognition or other gain.

I thank our former Dean, J. Hallock, the Brody School of Medicine's present leaders (Drs. P.J. Kragel and R. Reinhart, and Mr. G.Vanderpool), and Dave McRae, Chief Executive Officer of the University Health Systems of Eastern Carolina (UHS), for their support. I am especially thankful to Phyllis DeAntonio, Diane Poole, and Linda Roberson of UHS for steadfast friendship and rare ability to analyze complex issues and suggest effective solutions.

The departed Chairman of the Department of Medicine, Dr. Robert Wortmann, whose kindness, wisdom and idealism persuaded me to join ECU, has my undying grati-

tude for sharing the vision and action-plan for regionally integrated programs. His unwavering support and guidance in rebuilding the Hematology/Oncology program from the ground up—in the face of overwhelming inherited departmental deficits—required a moral courage I had not encountered before.

I thank all regional hospital and private medical group administrators who worked with our program for their willingness to experiment with (and share the costs and other risks of) new ideas that might help their communities. And, of course, I thank the countless local doctors for their generous support of the oncologists we recruited for their towns.

I thank Drs. Frank Torti, David Hurd, and Robert Cooper of the Wake Forest University Comprehensive Cancer Center for their mentoring of our programs and faculty. I thank the energetic leadership of the American Cancer Society, the wonderful people at the State Health Department, and, not least, the members and staff of the North Carolina Advisory Committee for Cancer Coordination and Control—the best in the country, in my opinion—for their continuous efforts to help the patients of our region with special programs.

Of course, this special issue would not have been possible without the erudite advice and guidance of Dr. Francis Neelon, Editor, Ms Florence Nash, Managing Editor, and all the members of the Editorial Board of the NCMJ.

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STATE OF NORTH CAROLINA
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MICHAEL F. EASLEY
GOVERNOR

July 31, 2001

Dr. A. Anagnostou
The Brody School of Medicine
East Carolina University
Greenville, NC 27898

Dear Dr. Anagnostou:

I am pleased to acknowledge the dramatic improvement in access to primary medical care that has occurred in Eastern North Carolina. Eastern North Carolina grew from a complement of 525 primary care physicians in 1975 to 1,525 in 1999 (a 190% increase). From 1979-1999 Eastern North Carolina also experienced a gain of 625 Family Nurse Practitioners (FNP) and Physician Assistants (PA).

This positive change emanates from the commitment of local leadership to improve access to medical care in their communities. I am proud to note that the investment of resources by state government was and continues to be crucial in supporting local efforts to improve access to primary medical care in their communities. The North Carolina Office of Rural Health recruited 843 physicians, FNP's and PAs to Eastern North Carolina between 1975 and 2001. In addition, this office assisted 37 Eastern North Carolina communities in establishing community-based medical practices in their communities.

Our investment in the ECU School of Medicine has greatly increased the supply of primary care physicians for Eastern North Carolina. Our successful investment in the North Carolina Area Health Education Centers Program has significantly increased the retention of primary care providers within Eastern North Carolina.

As a result of these local and state partnership efforts the geographic access to primary medical care has dramatically improved in Eastern North Carolina. However, additional improvements are needed to eliminate financial access barriers for our uninsured/underinsured populations.

In addition, access to dental care is a growing concern. I am hopeful that in the coming years substantial progress can be made in making these services more accessible.

With kindest regards, I am

Very truly yours,

A handwritten signature in black ink, appearing to read "Mike Easley".

Michael F. Easley

MFE:jb

CC: Department of Rural Health



LOCATION: 116 WEST JONES STREET • RALEIGH, NC • TELEPHONE: (919) 733-5811



**State of North Carolina
Office of the Lieutenant Governor**

BEVERLY EAVES PERDUE
LIEUTENANT GOVERNOR

June 21, 2001

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The Brody School of Medicine
Brody Science Building
East Carolina University
Greenville, NC 27858-4354

To the Brody School of Medicine:

As we recognize and celebrate the 100th anniversary of the North Carolina Medical Journal, I send my heart felt congratulations to the Brody School of Medicine at East Carolina University. Over the past century, healthcare in the eastern part of our State has come so far. Much of this progress can be attributed to this special medical school.

North Carolinians take pride in the legacy of commitment that is associated with the Brody Medical School. In the early 1960's, under the leadership of Dr. Leo Jenkins, committed men and women proposed the idea to establish this institution. The dream of these individuals and their long fight to be heard makes me proud today. The General Assembly of North Carolina appropriated funds for the establishment of a four -year medical school in 1974. The legislature set forth a three -part mission to increase general medical care in the Eastern region of our State, improve primary care physicians; and enhance access to the medical field for minority students. I applaud The Brody School of Medicine for a mission accomplished.

Brody Medical School is good for the East and this school is good for North Carolina. Caring, competent physicians, skilled specialists, and the commitment of community leaders all play a key part in the outstanding services provided. I am proud of what you are doing in the east and what it means to people across our State. Call on me if ever I can be of any assistance.

With best regards, I am

Sincerely,

A handwritten signature in black ink, appearing to read "B. Perdue", written over a circular stamp.

Beverly E. Perdue
BEP:mmf





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November 20, 2001

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Athanasius A. Anagnostou, M.D., FACP
Brody School of Medicine, East Carolina University
Professor of Medicine, Department of Hematology/Oncology
Greenville, NC 27858-4354

Dear Dr. Anagnostou:

It is a pleasure and an honor to acknowledge the accomplishments of the medical community in Eastern North Carolina over the last quarter of a century.

We should all take pride in our accomplishments. The establishment of the Medical School in Greenville assisted immensely in this evolution of a high standard of medical care in the community. Legislative funding has contributed to the growth in the number of competent primary care physicians, highly skilled specialists, as well as, the growth in the science and technology capabilities; and the building of the Life Science Building has greatly enhanced the overall health care.

My vision for the medical community is to build a Dental School and a Pharmacy School. These two additions would greatly contribute to our continued growth and excellent standard of medicine. East Carolina Medical School will soon become renown as a medical center in our Nation.

The continued growth of the medical community will only bring good to the economy and health care in Eastern North Carolina.

Sincerely,

Ed Warren
Senator, Ninth District

dl





NORTH CAROLINA GENERAL ASSEMBLY
PRESIDENT PRO TEMPORE
SENATOR MARC BASNIGHT
RALEIGH 27601-2808

August 27, 2001

Athanasius A. Anagnostou, M.D., FACP
Brody School of Medicine
East Carolina University
Greenville, NC 27858

Dear Dr. Anagnostou:

Please accept my warmest greetings and most sincere appreciation to you and all the staff at the Brody School of Medicine for your contribution to improving healthcare in North Carolina.

As we step back and review the accomplishments of recent years, it's clear that ECU and its School of Medicine have played an integral part in the effort to help thousands of North Carolinians lead healthy and more productive lives.

I thank you and all the members of the ECU community for providing this great gift to our state.

Sincerely,

A handwritten signature in black ink that reads "Marc".

Marc Basnight

MB/rl



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July 26, 2001

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Dear Dr. Anagnostou:

As a lifelong resident of eastern North Carolina, I have had the pleasure of watching the East Carolina University Brody School of Medicine and area hospitals grow by leaps and bounds. Our region has gained national prominence due to the excellent medical services and technology offered by these and other institutions.

It is only proper, then, that there be an issue of the *North Carolina Medical Journal* that is devoted solely to the changes in health care access and delivery to Eastern North Carolina. Our region's members in the General Assembly have worked tirelessly to ensure that our area has the proper resources for medical and health care needs. This year I have co-sponsored bills regarding the issues of patient protection, Medicaid coverage of breast and cervical cancer, and prescription drugs. I look forward to addressing these and other health care related issues in coming legislative sessions.

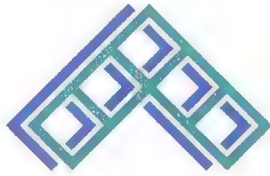
However, our work in Raleigh can only accomplish so much. It is the doctors, nurses, specialists, and staff in the region who do the real work and who continue to innovate and improve the region's health care. It is fascinating to read and hear about their work at the School of Medicine in the areas of diabetes, cancer therapy, allergic disease, cardiovascular disease, alcohol and drug abuse, obesity, transplant immunology and biotechnology.

I offer my thanks to everyone who has been involved in these efforts. It is an honor to represent Eastern North Carolina, and I will continue to promote these vital health-related issues in the future.

Sincerely,

Scott Thomas
North Carolina Senate
Third District





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Demography and Health Care in Eastern North Carolina

Thomas C. Ricketts, PhD, David L. Pope, MHA

If you have been in North Carolina for any length of time, it is likely that you have noticed the differences between “Down East” and the rest of North Carolina. These differences run deeper than just preference in the style of barbecue sauce. Eastern North Carolina is the product of a unique pattern of settlement, agriculture, and geography that the rest of North Carolina does not share.

The health status of people living in the eastern counties is generally lower than in the rest of the state. Mansfield et al¹ highlighted the increased all-cause mortality and coronary heart disease mortality in eastern North Carolina compared to other regions of the state. In this article we explore the reasons for this difference by examining recent trends in the economy and demography of the region—how these characteristics may lead to “medical under-service,” and how that can be measured. This article also illustrates how these unique eastern North Carolina trends present opportunities and challenges for the health care community.

Method

Simply defining what we mean by “eastern North Carolina” can be a challenge. Geographically, the region is part of the Atlantic Coastal Plain that stretches from Virginia through northern Florida, an area of largely flat, low-lying terrain drained by many relatively small rivers. The coast is guarded by a string of barrier islands, some of them uninhabited, some densely developed because of tourism and seasonal homes. The western boundary of the coastal plain is typically considered the “fall-line,” at one time the limit of river navigation. In North Carolina, the coastal plain is often described as

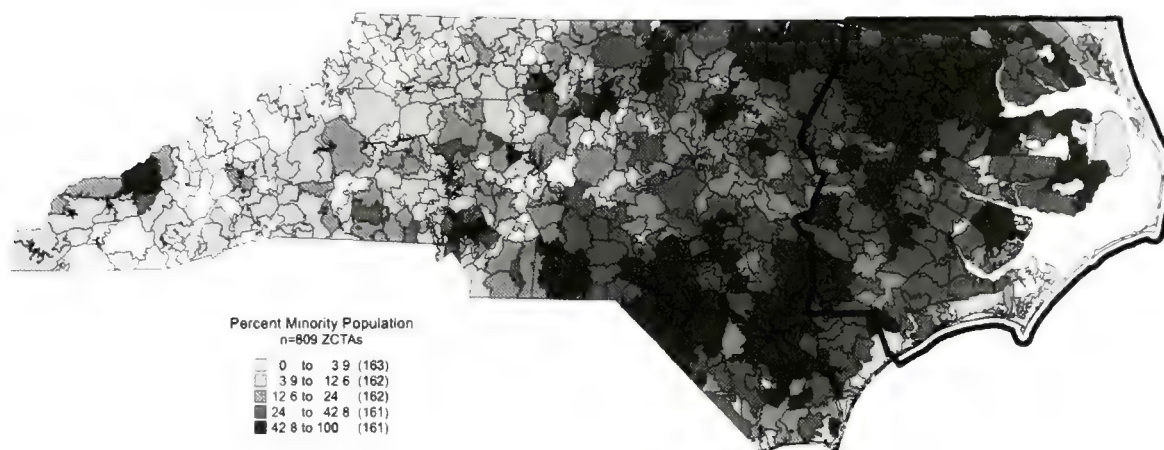
those counties east of Interstate 95.² For this article, we will consider eastern North Carolina to comprise the 29 counties of Health Service Area VI (the counties south of the Virginia border and east of the westernmost boundaries of Halifax, Nash, Wilson, Wayne, Duplin, and Onslow Counties).

Demographic Trends. Eastern North Carolina makes up 28% of the total land area of the state but contains only 12% of the state’s population. The region shows wide but not extreme variations in population density, and includes four metropolitan statistical areas (MSAs) surrounding Wilmington, Greenville, Goldsboro and Rocky Mount. Currituck County is considered part of the Norfolk-Newport News MSA due to commuting patterns by residents of that county.

Eastern North Carolina was settled largely to exploit the timber and fisheries resources of the region, but farming became the dominant occupation and persisted as such well into the twentieth century. Dams constructed early in the eighteenth century made waterpower available, but slow-moving rivers and lack of sharp relief kept the region from becoming more industrialized. The original pattern of market towns surrounded by agricultural villages and open-land settlement broken by large tracts of forest, swamp, and pocosin meant the area would be sparsely settled. That pattern has continued. The rural nature of the region and lack of easy transportation north to south meant difficulty in developing the area’s resources. The region was “left behind” by the progressive development seen in the more industrial piedmont portion of the state. Still, the region has grown more rapidly in the recent past than at any time since its settlement. Between 1990 and 2000, the area’s population density increased from 54 persons per square mile to 70 (the rest of North Carolina moved from 75 to 112 persons per square mile). The disparity between the urban and rural parts of the state has become apparent to political leaders, who have paid increasing attention to economic and human resource development in the east. That attention has led to

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Figure 1. Percent Minority Population in North Carolina, 2000
Those Identifying One or More Race Other Than White by ZIP Code Tabulation Area



Source: US Census Bureau (Standard File 1); 2001
Prepared by the North Carolina Rural Health Research and Policy Analysis Center, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill

creation of economic development zones, and the classification of counties into "tiers" that qualify them for varying levels of support. Most recently, the North Carolina Rural Prosperity Task Force, looking at the development needs of poorer, rural, eastern North Carolina counties, made a series of recommendations to improve their economic condition.³

But there is a wide range in rural conditions, and not all rural communities suffer equally. For example, eastern North Carolina has a wide range of population densities. Remote Hyde and Tyrrell Counties, with 9.5 and 10.6 people per square mile, respectively, are the least dense; their population dispersion poses challenges to development that are based on problems of distance and infrastructure. Other counties have high concentrations of low-income residents. The economies supporting these counties are based on low-wage service, light manufacturing, and agriculture (which has experienced workforce contraction). Wayne and Pitt Counties, whose populations are concentrated around cities, have the highest population densities in eastern North Carolina (slightly more than 205 persons per square mile). These counties resemble urbanized areas and have the capability to support the technology and infrastructure that attracts development.

Race and Ethnicity. In 2000, whites comprised 62% of the population of eastern North Carolina, compared to the statewide average of 72%. The proportion has declined slowly over recent decades, from 65% in 1970 and 64% in 1980. ZIP code data from the 2000 Census reveal that nonwhite populations are concentrated in the northeastern and central parts, rather than being equally distributed across the region (Figure 1), and six eastern counties (Bertie, Edgecombe, Halifax, Hertford, Northampton, and Warren)

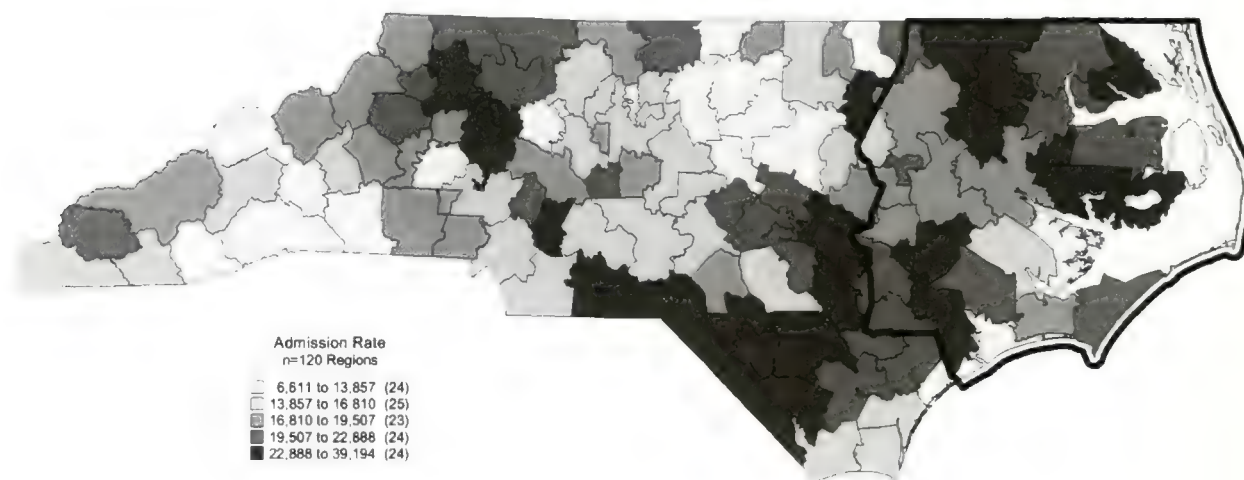
reported that nonwhites constituted a majority of their population. These counties stand in contrast to pockets of high white preponderance along the coast, the Outer Banks, and places with intense tourist activity. The region has significant native American populations; the state-designated Coharie, Haliwa-Saponi, and Meherrin American Indian tribal areas include 4,080 persons who list their racial classification as Native American.

Education and Economic Factors. Eastern North Carolina has significantly lower income levels than North Carolina as a whole. In 1999, per capita income in North Carolina averaged \$26,463, but in the eastern region it averaged \$18,550. None of the 29 eastern counties reached the state average; Tyrrell County was lowest at \$13,560 per capita and Dare County highest at \$24,566. Fourteen of the 25 North Carolina counties with the lowest per capita incomes were located in this region.

The disparity between eastern North Carolina and the rest of the state is also seen in the percentage of the population aged 25 or older who are college graduates (7.9%, compared to the statewide rate of 11.1%). Only two eastern North Carolina counties, Pitt and Dare, rank above the statewide rate, while thirteen have rates below 6%. In Duplin County, only 4.3% of the population is college-educated, ranking it last in the region and the state.

The financial and educational disparities that exist between eastern North Carolina and the rest of the state—and even within the region itself—are important determinants of health outcomes. Recent research suggests that the size of the gaps between rich and poor, or educated and uneducated, account for decreased health status better than overall income or education levels. Waldmann, in an international

Figure 2. Admission Rates for Ambulatory Care Sensitive Conditions: 2000
Age-Adjusted Rates for All Residents per Standard Million Population by Primary Care Service Area



Sources: HCIA Inpatient Discharge Database: Fiscal Year 1998: October 1, 1999 to September 30, 2000; US Census Bureau (Standard File 1, 2001); Claritas Incorporated, 1995.
Prepared by the North Carolina Rural Health Research and Policy Analysis Center, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill

comparison of income inequality and mortality, found that “controlling for real incomes of the poor, for indicators for the amount of health care available to the relatively poor, and for other variables, a greater share of income going to the rich is correlated with higher infant mortality.”⁴ In a study closer to home, Kennedy et al found a statistically significant correlation between income inequality and mortality across the fifty states. Most notable was the strong association between the income inequality and treatable causes of mortality, such as pneumonia, hypertension, and tuberculosis.⁵ These findings suggest that if we are to improve health status in this part of the state, we must focus on the issue of economic and educational disparity, as well as on conventional targets, such as access to medical care.

Primary Care Service Areas and Preventable Hospitalizations

To understand the relationship of health status (measured by population-based rates of illness) to the availability of primary health care, we must construct appropriate denominators of primary care practice. To do this, we used population and practitioner location data to construct discrete geographic areas of primary care service. We had available Census data for US Postal Service ZIP code areas and all census divisions; residence of hospitalized patients by ZIP code; practice locations for physicians, nurse practitioners, and physician’s assistants by ZIP code; and the locations of primary care clinics and related programs by ZIP code. (For the overall supply and distribution of primary care providers in the region, see the article by Mansfield et al on page S26.)

The goal of our analysis was to determine access-related health status—measured as the rate of preventable hospitalizations—relative to the supply of primary care practitioners.

Because primary care doctors tend to locate in a limited number of postal ZIP code areas (representing locations where access to care is high), we used cluster analysis to determine whether coherent combinations of ZIP areas surrounded concentrations of physicians. Cluster analysis to identify service areas was used in the original structuring of similar service areas in California. Makuc and colleagues^{6,7} used clustering to create hospital service areas that have been analyzed in studies of primary care labor market areas.⁸ The clusters were created with the “Cluster” and “Tree” procedures in SAS, using the average-link agglomerative hierarchical method. This created service areas that agreed with empirical knowledge of the service areas throughout the state. After iterations of the clustering procedure using fewer and greater numbers of clusters, the most reasonable solution came from a statewide model that specified 120 clusters. Some of these contained no full-time doctors, but were retained as primary care service areas because they were “rational service areas” for primary care based on the location of population concentrations. Primary care ratios were created using percentages of primary care clinical activity time reported by physicians, nurse practitioners, and physician’s assistants on their annual license registration forms. The resulting clusters were transformed into regions with separate boundary definitions and displayed as choroplethic (shaded) maps. The primary care clusters were reviewed by experts in primary care from the statewide family practice association, the North Carolina Area Health Education Centers program, and the North Carolina Office of Rural

Table. Health professional shortage areas in Eastern North Carolina

County	Federal designation*				Population served by one primary care provider		
	1974	1980	1990	2001**	Raw ratio**	Adjusted ratio**	Backed out ratio**
Beaufort		PC	PC	PC	1734	2823	2881
Bertie	WC	WC	WC	WC	3254	4946	5447
Camden		WC		WC	7992	8659	8659
Carteret			PC		1836	2225	2225
Chowan					1326	2078	2078
Craven					1395	1897	1897
Currituck	WC	WC	WC	WC	6858	7552	7552
Dare	WC	WC			2483	2802	2802
Duplin		WC	WC	WC	2066	3104	3626
Edgecombe		WC	WC	WC	2629	4132	4565
Gates	WC	WC	WC	WC	21514	22558	23769
Greene	WC	WC	WC	WC	3732	4718	6777
Halifax			PC	WC	1744	3229	3376
Hertford	WC				1088	2397	2495
Hyde	WC		WC	WC	3681	5614	5614
Jones	WC		WC	WC	2034	3218	3218
Lenoir				PC	2306	3267	3365
Martin			WC	WC	2468	3134	3134
Nash			MP		1380	2049	2105
Northhampton	WC	WC	WC	WC	2688	4002	4002
Onslow		WC	WC		2506	2917	2960
Pamlico	WC			PC	2190	3135	3135
Pasquotank	PC				1087	1945	1945
Perquimans	WC	WC		WC	4493	5493	5493
Pitt					749	1540	1544
Tyrrell		WC	WC	WC	3000	5171	5171
Washington	WC	WC	WC	WC	5124	6213	6497
Wayne					1741	2346	2407
Wilson			MP	WC	2494	3407	3407

*Federal designation as health shortage area: WC = Whole County; PC = Part County; MP = Migrant Population

**Method proposed for 2001; see text for explanation.

Health. The assigned boundaries agreed with the experts' perception of the structure of primary care market areas in the state. These areas were then used to aggregate rates of ambulatory care sensitive hospital admission rates.

A measure of health status that reflects the ability of people to gain access to the health care system is the rate of hospitalization for ambulatory care sensitive conditions (ACSC). Disorders classified as ACSC include diabetes mellitus, cellulitis, pneumonia, hypertension, congestive heart failure, dehydration, and chronic obstructive pulmonary disease^{9,10} (a full listing of disease categories used in this analysis is available from the authors). The ACSC rate has been proposed as a marker for access to primary care, and has gained wide acceptance as a mechanism for making policy choices. For example, Nebraska has used the measure to assess overall system adequacy,¹¹ and the state of New York has used it to evaluate a health professional recruitment and retention project.¹² The states of Utah,¹³ Virginia,¹⁴ and West Virginia¹⁵ have described system performance based on these rates. However, the ambulatory care sensitive admissions

criteria proposed by Billings,¹⁶ and adapted by others, have not worked consistently well in rural areas.¹⁷ This is important for eastern North Carolina because it is so rural.

Figure 2 shows the relative rates of hospitalization for the 120 primary care service areas in North Carolina. The highest rates are found in four separate clusters in eastern North Carolina. Except for isolated parts of Hyde County, the rate differences appear to be related more to economic characteristics of the areas than to the availability of health care resources. As we have shown elsewhere, income and unemployment rates are correlated with these rates of hospitalization but primary care practitioner supply is not.⁹

Areas of Primary Care Underservice

The National Health Service Corps (NHSC) was created in 1970. Since then the federal government has identified areas of Health Professional Shortage, making them eligible for

federal support including the placement of physicians and other clinicians.¹⁸ The Table summarizes the designation status of eastern North Carolina counties for four selected time points (1974, 1980, 1990, and currently). Some counties (Bertie, Currituck, Gates, Greene, Hyde, Northampton, and Washington) have been almost continuously designated as shortage areas under this system. These chronically underserved areas have benefited from federal and state programs that encourage providers to practice there, but it is clear that these programs have not solved the underlying problems; the search for a permanent increase in access to primary care in these counties must continue.

The last three columns of the Table show how application of a proposed new method would identify underserved areas. Previously, two different methods had been used to designate underservice; both considered the ratio of primary care physicians-to-population the most important component. This ratio, though often used, is only a crude measure because raw ratios do not take into account the higher needs of certain populations such as the elderly. (Two counties with similar populations but different age-group distributions will have different primary care needs.) Primary care physician ratios also do not adequately estimate supply and demand if those living within a service area do not have real access to the doctors located there. Another problem is that county boundaries make arbitrary borders with which to designate areas of underservice. Providers often serve populations that stretch past county lines, as can be seen when the primary care service areas are designated by ZIP codes. Furthermore, poverty, minority status, and language capability can all be barriers to primary care access. Finally, primary care physician ratios may not accurately reflect access since they neglect the contribution of physician assistants (PAs) and nurse practitioners (NPs). To measure true under-service it is necessary to determine how many individuals in the population do *not* have access to providers, rather than merely counting the number of doctors and dividing by total population.

Efforts are under way to elucidate the barriers to access in areas of under-service. The Bureau of Primary Health Care (BPHC) is responsible for designating areas as underserved and therefore eligible for federal assistance. In response to Congressional pressure, the BPHC issued a notice in the September 1998 *Federal Register*, proposing to change the way Health Professional Shortage Areas were calculated, and to combine the new calculations with the Index of Medical Underservice (which designates areas as eligible for location of Community Health Centers). The Bureau invited states and stakeholder groups to comment on the proposed rule change, and encouraged stakeholder groups to look at what effect the new rule would have on specific communities. After receiving over 800 (mostly negative) comments, the Bureau commissioned the Cecil G. Sheps Center for Health Services Research at the University of North Carolina to develop and test an alternative method.

The method proposed by the Sheps Center estimates the rate of primary care utilization (in a county or other defined population) that would exist if there were no barriers to access, and compares the estimate to a threshold ratio. The method accounts for PAs and NPs in calculating an idealized ratio of primary care practitioners to population, and makes adjustments to the population part of the ratio based on the characteristics of the county (or area) that are known to affect access to care (such as the percentage of population with income less than twice the federal poverty level, the percentage that is nonwhite, employment status, and population density). The final adjusted ratio is compared to the threshold ratio of one full time equivalent (FTE) primary care physician per 3,000 residents. The 1:3,000 threshold was chosen because it is used in current designation criteria, and because it represents a condition where a population is one FTE primary care physician "short" (a population of 3,000 people with an age-gender structure matching the national average would "require" two FTE primary care physicians). This designation method provides the county-level adjusted primary care provider-to-population ratios found in the three right hand columns of the Table. The raw ratio column is calculated by dividing the number of full-time equivalent primary care providers (including NPs and PAs) practicing in the county by the unadjusted population of the county. The adjusted ratio column takes into account age, gender, and access factors, which usually makes the population appear larger than the raw count of people. Finally, because the presence of some of the practitioners in these counties is due to federal programs that seek to correct underservice, the last column in the table displays the ratio that "backs out" those practitioners. That final ratio reflects the number of providers to the size of the population, adjusted to account for their ongoing need for services.

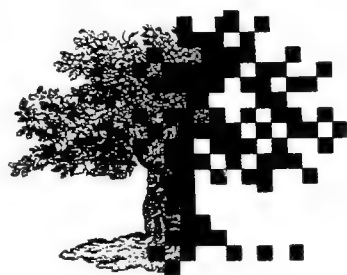
Conclusions

The demographic picture of eastern North Carolina is one of overall growth and progress, but it includes a disturbing pattern of disparity between various parts of the region. It seems fair to say that the region is racially and economically divided between haves and have-nots, and this is reflected in health status indicators. This pattern of morbidity does not mean that the primary care system is not meeting the needs of the population. Rather, the pattern indicates a lack of connection across the system and between the system and the population served, resulting in higher rates of preventable hospitalizations.

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Primary Care in Eastern North Carolina

Past, Present, and Challenging Future

Christopher J. Mansfield, PhD, Ralph C. Worthington, PhD, and Matthew D. Curry, MA

The health of the citizens of eastern North Carolina is persistently as bad as in any region of the nation, and improving the health status of those citizens has long posed a daunting challenge. The isolation of rural areas and the lack of public transportation make access to health care very difficult for many; poverty and the general economic condition of the region create further barriers. Many working-class citizens simply cannot afford private health services, and few rural communities have the tax base to support adequate public health services. The traditional sources of income—agriculture, forestry, and fishing—have offered relatively low wages with limited or no health insurance benefits. It is ironic that these very occupations have the highest rates of job-related injuries.

By any measure, the health status of the population of the region is poor. Death rates for a number of chronic diseases are among the highest in the nation, and cardiovascular disease and trauma rank especially high as causes of excess morbidity, disability, and mortality. In this paper we describe an important public effort to improve health in eastern North Carolina (defined as the 29 counties of Health Service Area VI). We begin by describing the state of the primary health care system and the health of the region in the late 1960s and early 1970s. We next describe the important role played by East Carolina University, Pitt County Memorial Hospital, and other institutions to increase the supply of primary care providers and extend the health services available in the region. We end by reviewing the current state of health and health services and discussing some of the future health care needs in the region.

Primary Care Before 1980: The Disturbing Shortages

In the late 1960s, the nation became aware of a growing shortage of primary care physicians. Nowhere in the country was the situation more acute than in eastern North Carolina. In 1964, East Carolina College was challenged to do something about the problem. A country doctor with too many patients, and no luck attracting other doctors to help him, urged the College to start a medical school. Dr. Ernest Furgurson, a general practitioner in Plymouth, NC, had just spoken to medical students and faculty at Duke University about rural practice; on his way back home he stopped in Greenville to share his frustrations and propose a solution to Leo Jenkins, president of East Carolina College. President Jenkins responded that East Carolina College was not in the medical business, but Dr. Furgurson reminded him that the college's motto proclaims its duty to serve. He asked rather bluntly, "Why don't you live up to the motto? Who are you serving if you just sit in this cesspool?"¹

A number of studies documented the shortage of doctors, especially primary care doctors, in North Carolina—particularly in rural and eastern North Carolina. In 1968, rural areas had only 3 doctors for every 10,000 people compared to 9.6 per 10,000 in urban areas.² Statewide, some counties had no doctors at all, and the average general practitioner served more than 4,000 people. A fifth of the rural physicians were over 70 years of age.³ We do not have reliable data on the physician workforce in eastern North Carolina during 1960s, but a 1977 health systems plan for

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that region reported primary care availability by county.⁴ That plan clearly indicated that it, like other areas in the US, had problems with the supply and distribution of primary care doctors, but that the problem was much worse there. Across the US there was one primary care doctor for every 1,446 people; in eastern NC it averaged one for 2,449, and almost half of the doctors were located in the six largest counties of the region. In many counties each primary care doctor served more than 3,000 people.

The actual shortage looked even worse when the aging of the primary care work force was considered. In 1976, the average age of general practitioners, who accounted for more than a third of all primary care providers in eastern NC, was 55; the average age of all primary care providers was 51. This meant that a large proportion of the primary care workforce was nearing retirement, which would worsen the population-to-physician ratios. Anticipated retirements, coupled with the limited number of new doctors moving to the region, were cause for alarm.

Although primary care doctors were in short supply, there was no doubt about the great need for their services.⁴ The crude death rate for the region, a measure of the overall burden of disease, was 14% higher than the statewide rate; the infant mortality rate, a general indicator of population health, was 8% higher than the state rate and 38% higher than the national rate. The rate of death from heart attacks was 12% higher than the state rate and 8% higher than the national rate; the death rate for stroke exceeded state and national rates by 14% and 29%, respectively. These mortality statistics⁴ indicated the major need for primary care in this part of the state.

During the late 1970s, tremendous efforts were made to increase the availability of health services in eastern NC. East Carolina College became East Carolina University (ECU), and the North Carolina legislature authorized it to create a school of medicine (now named the Brody School of Medicine). The three primary missions of the school were (1) to train primary care providers for North Carolina, particularly for rural areas in that region and the state; (2) to increase access of underrepresented minorities to medical education; and (3) to improve the health of eastern NC. During this time, the state's regional Area Health Education Centers were created, and ECU joined other universities and community colleges in the region to increase the array of health services by developing allied health programs. Pitt County Memorial Hospital became the major teaching hospital of the new medical school; it tripled its capacity and became a regional referral center. Most hospitals in the eastern counties grew during this period, but three closed because prosperity and

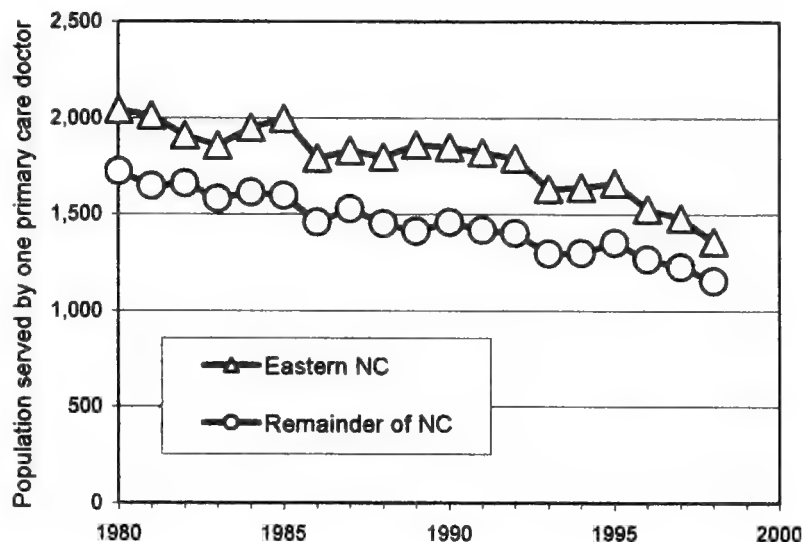


Figure 1. Ratio of primary care doctors to population in North Carolina.

growth eluded the communities that depended on them, and private-market health care could not meet the needs of the poor and powerless. In an effort to sustain rural health systems, state and federal government supported development of over two dozen rural health clinics, but each required the recruitment of primary care physicians, who were already in short supply. The hope of many was that the new school of medicine would produce new doctors for the region.

Primary Care in Eastern North Carolina: A Current Look

The efforts of ECU and other organizations to expand primary health care services are evident throughout the region today, although some of the rural clinics that were established did not survive, and not all counties have benefited equally from the education of more primary care physicians. The availability of primary care has improved over the last 20 years, as shown by the steadily declining ratio of people to primary care doctors (Figure 1). The number of licensed and active physicians, based on data maintained by the Sheps Center at Chapel Hill, has shown a 34% improvement;⁵ when only non-institutional doctors engaged in direct patient care are considered, there has been a 21% improvement.^{4,6} Primary care access has further improved because the ratios of nurse practitioners and physician assistants to population are better by 63% and 70%, respectively. But there is still a shortage of primary care doctors in eastern NC. The current ratio (one primary care doctor per 1,358 people) is still 18% worse than the ratio for the rest of the state (1:1,154) and 11% worse than the national ratio (1:1,222).⁷

Table 1. Number of primary care physicians in each county, ratio of primary care physicians to population, and the percent change in the ratios between 1976 and 1999

County	1980		1998		Change 1976-1999
	Number	Ratio	Number	Ratio	
Beaufort	21	1922	27	1610	16.2%
Bertie	5	4205	8	2513	40.2%
Camden	1	5829	1	6320	-8.4%
Carteret	23	1787	37	1618	9.4%
Chowan	14	897	14	1023	-14.1%
Craven	35	2030	72	1244	38.7%
Currituck	2	5545	5	3389	38.9%
Dare	11	1216	14	2016	-65.7%
Duplin	15	2730	26	1717	37.1%
Edgecombe	16	3499	21	2613	25.3%
Gates	2	4438	1	9986	-125.0%
Greene	2	8059	2	9036	-12.1%
Halifax	23	2395	40	1380	42.4%
Hertford	15	1558	22	986	36.7%
Hyde	2	2937	1	5301	-80.5%
Jones	8	1213	7	1255	-3.5%
Lenoir	33	1813	41	1440	20.6%
Martin	11	2359	19	1344	43.0%
Nash	41	1638	78	1134	30.8%
Northampton	11	2018	7	2977	-47.5%
Onslow	29	3889	79	1878	51.7%
Pamlico	5	2080	4	3009	-44.7%
Pasquotank	21	1355	37	950	29.9%
Perquimans	1	9486	3	3680	61.2%
Pitt	76	1186	212	581	51.0%
Tyrrell	0	0	1	3625	0.0%
Washington	6	2467	5	2616	-6.0%
Wayne	41	2367	76	1503	36.5%
Wilson	38	1661	39	1773	-6.7%
HSA VI	508	2043	899	1358	33.5%

Data Sources: 1976 data from Eastern Carolina Health Systems Agency, 1999 data from Sheps Center for Health Services Research.

Distribution of doctors also remains a problem. Table 1 shows county-level changes in the ratio of people to doctors in eastern North Carolina between 1976 and 1999. In eleven counties, primary care doctors were less available in 1998 than in 1980. More primary care providers are needed to meet the needs of underserved counties.

The overall increase in access to primary care in the area is due, in large part, to choices made by graduates of the ECU medical school and its residency programs to enter primary care practice in ENC. As of June 2000, the ECU school of medicine had graduated 1,285 doctors, 853 of whom have

completed residency training and are now in practice. Another 739 graduates of other medical schools have completed residency training in programs affiliated with University Health Systems of Eastern Carolina (ECU/UHS).

Of the 1,592 graduates of either the ECU medical school or its residency training programs, 802 (50%) are practicing in North Carolina, and 434 (27% of the total) are practicing primary care in North Carolina. Table 2 shows the number of practicing physicians in North Carolina who graduated from the ECU medical school or received their residency training at ECU/UHS. Of the 853 ECU medical graduates now practicing, 482 (57%) chose to practice in North Carolina (264 of these practice primary care); of the 997 resident physicians trained at ECU/UHS, 516 (52%) practice in North Carolina (276 in primary care). A substantial number of resident trainees (258) graduated from medical school at ECU; they are not double counted in the "Either" column of Table 2.

The ECU Brody School of Medicine and its residency programs have so far supplied 342 "new" doctors, a little more than a fifth of its graduates, to eastern North Carolina; half (174) of them are practicing primary care. Just fewer than 200 of the graduates (either school or residency) are practicing in rural counties (all specialties). A total of 220 practice primary care in either rural counties of the state or non-rural counties of eastern NC. The new medical school clearly has had a positive impact on availability of primary care in areas of the state with the greatest needs.

Despite the increased availability of primary care and

other health-related services, the health status of eastern North Carolinians remains precarious. Mortality rates show that stark and troubling differentials persist between that area and the rest of the state and the nation. Over the last 20 years its mortality rate has been 12% higher than in the rest of the state.⁸ The age-adjusted death rate for heart disease in eastern NC is 10% higher than the rest of the state, and for unintended injury, the mortality rate is 14% higher than in the rest of the state, and 35% higher than in the nation. The mortality rate for stroke is 11% higher in that region than in the rest of state, 41% higher than for the nation, and higher than any state rate. Gauging the burden of disease by premature mortality (years of life lost before age 75), the nation, state, and region have all made progress (Figure 2), but geographic disparity clearly persists.

The improvement in premature mortality during a time of improvement in availability of primary care might suggest that the two are correlated. Policy makers may be comforted by the coincidence of increasing availability of physicians and decreasing rates of premature mortality; however, a causal relationship has yet to be established. Certainly, primary medical care should have an impact on diseases such as heart disease and stroke. If primary care availability is indeed part of the solution to the health care problems of the region, the eastern part of the state still has a long way to go to catch up.

Table 2. Choice of practice location and type by number of graduates of ECU medical school and ECU residency programs*

Location	ECU Medical School (n=853)	ECU/UHS Residency (n=997)	Either Medical School or Residency (n=1,592)
North Carolina	482 (57%)	516 (52%)	802 (50%)
Primary care	264 (31%)	276 (28%)	434 (27%)
Other specialties	218 (26%)	240 (24%)	368 (23%)
Eastern NC	168 (20%)	279 (28%)	342 (21%)
Primary care	91 (11%)	139 (14%)	174 (11%)
Other specialties	77 (9%)	140 (14%)	168 (11%)
Rural NC	121 (14%)	130 (13%)	198 (12%)
Primary care	80 (9%)	81 (8%)	128 (8%)
Other specialties	41 (5%)	49 (5%)	70 (4%)

*In practice as of July 2000

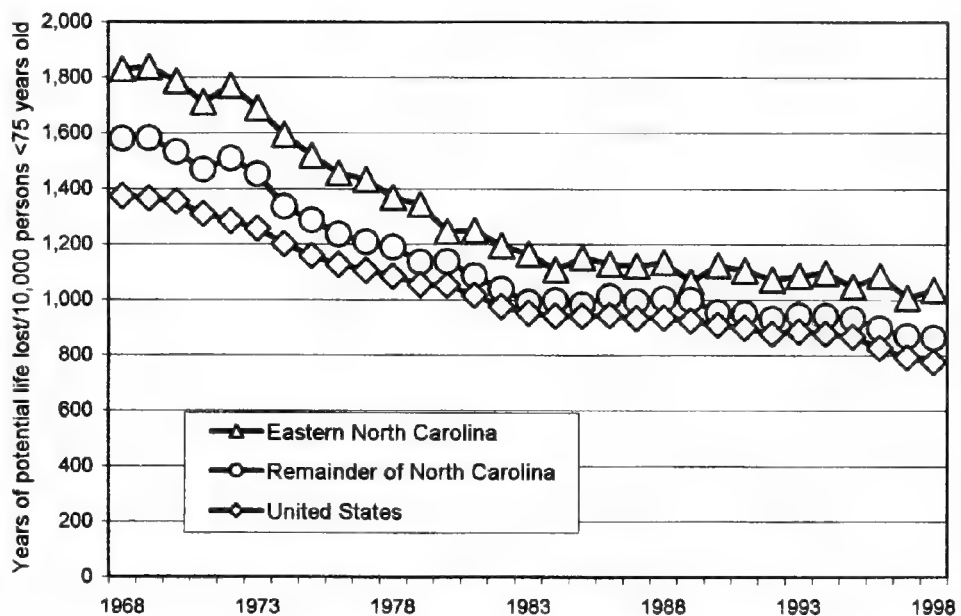


Figure 2. Premature mortality in the nation, state, and region.

The Future of Primary Care in Eastern North Carolina

The longstanding problems of shortage and maldistribution of primary care providers in eastern NC will continue to be an issue. There is no consensus about the optimal ratio of primary care providers to patient population. Hart et al

suggest the staffing ratios in a mature HMO as a standard: one primary care doctor for every 1,279 patients.⁹ By that benchmark, eastern North Carolina as a whole must improve by 6%. Using either the current national or state ratio as a standard, the region has even further to go (11% to 18% improvement). Within eastern North Carolina, a number of counties still have ratios exceeding 1:3000. This means that, if all citizens of the region are going to have accessible health care, they not only need more primary care physicians, but they need them in specific places. The importance of placement applies as well to mid-level providers and other health-related professionals. Increasing the supply and improving the distribution of primary care providers would certainly increase access to care in the region, but financial and geographic barriers to care in these eastern counties will also have to be addressed.

The poor health status of residents of eastern North Carolina will continue to pose a major challenge to the regional health care system. Additional providers, new services, and new ways of organizing care are needed to end the historical pattern of excess morbidity and mortality there. We will need greater emphasis on health promotion and

disease prevention in the primary care setting. The principal goals are the same for the region as for the state¹⁰ and nation as a whole: to increase the span and quality of life and eliminate health disparities.¹¹ Primary care providers can play an important role in preventing morbidity and mortality from chronic illnesses through education, screening, and early intervention. Improved access to tertiary care services can reduce premature deaths from injury and cardiovascular disease, two of the most important health problems in the region. Rural areas of the region need greater access to both primary care and tertiary care services. Most importantly perhaps, the health problems of eastern North Carolina need to be understood and approached from a population perspective, which would require expanding public health services and getting primary care physicians to understand and use public health concepts. The burden of chronic disease, the aging of the population, cultural diversity, and the threat of emerging infectious disease all present challenges to primary care physicians. Public health interventions that address health behaviors, access to care, use of health services, and broader social determinants of health and illness could have a major impact on the health of eastern North Carolinians.

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Surgical Services in Eastern North Carolina

A Story of Continuing Evolution

Paul R. G. Cunningham, MD, and Ruth Moskop, PhD

Dr. Leo Jenkins, Chancellor of East Carolina University from 1960 to 1978, said eastern North Carolina was a sleeping giant. Regional developments in the field of surgery over the last 30 years offer strong evidence that the sleeping giant has awakened. The 1975 affiliation between Pitt County Memorial Hospital (PCMH) and the new School of Medicine at East Carolina University (ECU) stimulated the growth of a regional medical center that now supports a complete range of surgical services. This year, as the Hospital celebrates its 50th Anniversary and the Brody School of Medicine celebrates its 20th graduating class, it is appropriate to document the influence of the surgical innovation fostered by the affiliation between the two institutions. It is equally worthwhile to explore the ways in which the presence of a regional tertiary care medical center in Pitt County has affected the practice of surgery in other counties of eastern North Carolina.

In an effort to understand and document the evolution that has taken place, we interviewed surgeons who have practiced in that region of the state over the latter half of the 20th century. Insights gleaned from those interviews are woven together here with an overview of surgical advances at the regional medical center. The resulting tapestry reveals the specialized surgical interventions available even to patients from well outside the region. Some of the problems in health care delivery that existed 30 years ago, however, continue to challenge the surgical profession today.

Surgery at Mid-Twentieth Century

The first orthopedic surgeon in eastern North Carolina, Dr. John L. Wooten, remembers the simple things that made a big difference when Pitt County's new hospital building opened in 1951. The new operating room, for instance,

allowed preservation of a sterile operating field because the building had air conditioning and there was no need to open the windows from time to time.¹ Dr. Wooten recalls the plentiful workspace in the operating room at Pitt Community Hospital on Johnston Street. By 1976, and even though the Hospital was celebrating its 25th anniversary (in a more modern building on Fifth Street), Dr. Pott, then the oldest living doctor in Pitt County, said that the operating room had come to look more like a New York subway!² Fortunately, new facilities were already under construction, so the Hospital was well positioned to assume its role as a teaching hospital when the first four-year class of ECU medical students arrived in the fall of 1977.

Dr. Robert Youngblood, a founder of the Wilson Surgical Clinic, has seen the parade of dramatic improvements in medical and surgical care that have come to eastern North Carolina. During the 1950s and 1960s, hospital construction increased, doctors' incomes began to rise (particularly after Medicare was enacted in 1965), and larger communities could attract board-certified specialists. Improvements in anesthesia, greater availability of antibiotics, an increase in the numbers of board-certified surgeons, and the arrival of anesthesiologists helped surgery to thrive.

Hospitals began to establish postoperative recovery rooms and emergency medical systems with 24-hour emergency room staffing. In 1964, three small, private hospitals in Wilson were replaced by a single 250 bed hospital. Dr. Youngblood recalls that during the 1970s practitioners at some of the major community hospitals, Wilson included, were worried about the effect of a new, state-supported medical center in Greenville. He reports, however, that "the thoughtful, carefully planned administration of the Department of Surgery at East Carolina University" minimized any negative effect on surgeons in the surrounding areas. In fact, Dr. Youngblood points out, activities at ECU have particu-

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larly benefited the regional community in the fields of surgical education, trauma, and cardiac surgery.

The Surgery Department at ECU

In 1978, four surgical residents began their training at PCMH. Giving credit to Dr. Walter Pories for his democratic leadership style as founding chair of the Department of Surgery, Robert Barnes, administrator of surgical services at PCMH, reported, "The interrelation between the Med School's Department of Surgery and the Hospital's Department of Surgical Services may be the best in the hospital. The staffs really work well together."⁴ With a solid working relationship in place from the very beginning, teams capable of supporting innovative surgical studies developed quickly. Dr. Pories and his colleagues set a lofty goal for themselves when they decided early on that ECU should become a progressive center for surgical education.

Between 1978 and 1983, Dr. Charles Rob, a British surgeon famous for his pioneering work in vascular surgery, served as Professor of Surgery at the ECU School of Medicine. Dr. Rob, who had performed the world's first carotid endarterectomy, came to Greenville from Rochester, NY, where he had been chairman of the Department of Surgery. In Greenville, after PCMH obtained appropriate angiography equipment, Dr. Rob introduced peripheral vascular surgery to the area.⁵ With his previous administrative experience, his keen insight into human nature, and his marvelous sense of humor, Dr. Rob not only helped shape departmental policies and procedures but fostered overall a positive, creative atmosphere in the new Department of Surgery as well.⁶ Seeking to address the health care needs of the underserved, in 1978 Dr. Pories began a study to test the effectiveness of gastric bypass surgery in treating Type 2 diabetes mellitus.

The study enrolled 608 patients over a 14-year period; the results of the "Greenville Gastric Bypass" were striking. No other therapy produced "such durable and complete control of diabetes mellitus."⁷ Success fostered further research. In 1984, Pories and Dr. Edward Flickinger received a grant from the Robert Wood Johnson Foundation to study the social aspects of gastric bypass surgery and whether the procedure was effective in restoring morbidly obese patients to a productive, fulfilling life.⁸ By 1999, the School of Medicine was one of 12 in the nation (and the only site in the South) chosen for a Phase II clinical trial of an adjustable gastric band in treating obesity.⁹

Even as it was developing and testing ground-breaking surgical procedures, the Department of Surgery continued to enhance its teaching role. The installation of closed circuit TV in an operating room during the spring of 1980 was one early improvement. This allowed close student observation of delicate procedures, reduced contamination hazards in the operating room, and (by providing play-back capability)

increased the instructional potential of the surgery faculty.¹⁰ Members of the Department revived and enhanced a defunct journal, *Current Surgery*, which provided a forum for review articles acquainting residents and practicing surgeons with concise, current information. *Current Surgery* has recently been included in the *Index Medicus*.

Dr. Pories proudly says, "Whole new concepts in surgical education have come from ECU. People look to us—we're good at it!" In the 1980s he recruited Jay C. Smout, a PhD educator, to work on a curriculum guide for general surgery residency training. In 1992, these efforts reached fruition with publication of the Association of Program Directors in Surgery's first national curriculum for general surgery. The *Surgical Resident Curriculum*, now in its third edition, is a valuable guide not only for general surgery residents but for all surgeons studying for recertification. Pories looks forward to a revolutionary new approach to surgical training that will eliminate inefficiencies existing in the current system.

Recruiting and training minorities have been important missions of the School of Medicine at ECU from the beginning. A notable indication of success is the recognition that the Department of Surgery has received from the National Medical Association and the Association of Black Academic Surgeons for furthering the careers of black surgeons.¹¹

Neurosurgery and the Trauma Service

Dr. Ira M. Hardy, II, came to Greenville in 1968 as the first neurosurgeon to practice north of Wilmington and east of Raleigh. Drawn to eastern North Carolina by the prospect of a medical school in Greenville, Dr. Hardy supported medical education in a variety of ways. He lectured in the medical school's neuroanatomy course and arranged weekly neurology and neurosurgery conferences at the hospital.

When Dr. Hardy came to Greenville, neurosurgery played an important role in the Hospital's trauma service. In the late 1970s, patients who had been seriously injured were brought to PCMH from all over that part of the state. In cases of head injury, Dr. Hardy and his neurosurgical colleagues were the first to be called. They would then contact other specialists according to the needs of the trauma victim.¹² In 1983, PCMH was designated a Level I trauma center.

Dr. Cunningham joined the surgery department at ECU School of Medicine in 1984 and shortly thereafter collaborated with members of the Emergency Department and the Hospital Nursing Services to establish a dedicated Trauma Service. In 1988, the Hospital was designated a Level II trauma center. Research undertaken at that time by the Trauma Service recorded the kinds of injury particular to the eastern region. Because automobile accidents accounted for a large fraction of the most severe injuries, Dr. Cunningham

helped establish the Traffic Injury Prevention Program, which subsequently evolved into the Eastern Carolina Injury Prevention Program (led by Dr. Herbert Garrison).

Dr. Michael Rotondo arrived in 1999 to head a Division of Trauma Surgery. Existing resources were consolidated and new resources added to the ECU Trauma Service, leading to its designation that year as a Trauma and Surgical Critical Care Center of Excellence. Recent efforts of the Trauma and Surgical Critical Care team have significantly improved the surgical outcomes for severely injured patients. Expectations are that the Center will change the way trauma is handled in rural areas all over the country.

Advanced Specialty Surgical Services

The progress of surgery in the region bears witness to the dramatic developments in imaging technology and surgical techniques introduced during the 1980s. Laser surgery, for example, first came to eastern NC in 1985 when two operating rooms at PCMH were adapted to meet the special power and water needs of laser procedures. Drs. Dennis Sinar and Stefano Marcuard compared outcomes of gastrointestinal laser surgery to those of traditional surgical methods.¹³

Progressively through the decade, organ transplant services were established. In March, 1981, the ECU School of Medicine began a kidney transplant program.¹⁴ It attracted patients in such numbers that in August of 1985 Dr. Walter Pories, chairman of the Department of Surgery, reported that 10 of the 12 kidney transplants performed in North Carolina that month had been done at PCMH. That led the Hospital Board to expand the transplant program, and one year later the first combined pancreas and kidney transplant in North Carolina was performed on a 36-year-old farmer from Martin County.

Because of a lack of donor organs, the number of kidney transplants in Pitt County dropped from 40 in 1985 to 20 in 1993. At this point, Dr. Carl Haisch, director of the transplant program, encouraged a shift in the search for organ donors. He urged nephrologists and transplant coordinators to focus on communicating with patients and families in order to promote living kidney donation. By 1996, the renal transplant program in eastern North Carolina was thriving, and achieved a better than 90% survival of grafts—higher than the 80% reported nationally, and even more remarkable considering prevalence of hypertension and diabetes in eastern NC and the fact that 66% of the program's transplant recipients were black.¹⁵

Cardiac surgery developed at ECU during this period. It was estimated that every year 600 people living within the 29 counties of eastern North Carolina would require open-heart surgery for coronary artery disease or damaged or defective heart valves.¹⁶ After many months training nurses, assembling first-quality equipment, instruments, supplies, and,

above all, a fine surgical team, on July 10, 1984, Dr. W. Randolph Chitwood, head of ECU's new cardiothoracic surgery program, performed a triple coronary bypass procedure on a 47-year-old man from Rocky Mount—the first open heart surgery in eastern North Carolina. During his first year in Greenville, Dr. Chitwood performed 300 procedures, staying overnight at the hospital with the patient in each case.¹⁷ Subsequently, Dr. Erle Austin, a specialist in pediatric cardiovascular surgery, and Dr. J. Mark Williams, a specialist in heart arrhythmias, joined the team. In collaboration with PCMH and ECU School of Medicine, the cardiovascular team developed a Cardiovascular Diseases Center advanced enough that on February 17, 1987, a 58-year-old man from Beaufort County received the first heart transplant in the region.¹⁸ Currently, the Center carries out more than 1,200 open-heart surgeries of all complexities each year.

A Broader Perspective

Advanced specialty surgery was thriving in Greenville by the late 1980s, and at other hospitals and clinics in the region as well. Dr. Sydney Fitz C. Barnwell's story lends an interesting perspective to the perceived threat to surrounding medical communities posed by the developing medical center in Greenville. Dr. Barnwell, a board certified surgeon, came to New Bern in 1965; he was the only black doctor in Craven County, and at the Good Shepherd Hospital, a black hospital. Early on, he admitted black patients to that hospital only. Surgical patients had to be transported out to another hospital, then back again to the Good Shepherd for recovery.

Although well aware of the civil rights tensions of the 1960s, Dr. Barnwell felt warmly received in the area. He said three factors contributed his welcome in New Bern—not only by his patients, but by the white medical community as well: (1) Many of the people he treated could not afford to pay for their health care. Wherever he went, he felt needed, appreciated, and respected because he was providing real service. (2) As a board-certified surgeon with some specialty training, he was well qualified for the job he came to do. The outcome of one case during his first month of tenure in Craven County illustrates this. Dr. Barnwell met a patient in the emergency room who had been involved in a terrible car accident. Her head had crashed into the windshield, and her face was horribly mangled. His diligent surgery and surgical prowess impressed the nurses. The patient healed well and looked as if "she had had the greatest surgeon in the world." The "new black doctor's" skills became the talk of the town. Dr. Barnwell remembers that "lots of surgeons" looked over his shoulder as he operated at the New Bern hospital. Finally, (3) Dr. Barnwell cited his heritage. He had grown up in Guyana and so did not carry the same "historical baggage" to his interactions with white doctors that American blacks might have.

Barnwell practiced surgery in eastern NC for more than 20 years, but he reports that things became somewhat difficult for him after about 1980. He says, "It was the first time I ran into what I thought was prejudicial kinds of behavior in some doctors. . . . After the first 15 years, more surgeons came to the Medical School, and there was competition between Craven County Hospital and [East Carolina University School of Medicine]." Dr. Barnwell joined the faculty at ECU Medical School and served as Assistant Dean for four years. A sense of competition was in the air, and Craven County practitioners disapproved of his affiliation with the ECU. Unpleasant things happened. He "began to see things that the average black surgeon would. . . run against. . ." Dr. Barnwell, however, felt that surgery at Craven County Hospital "was as good as anything that Greenville could come up with," and he wanted to keep it that way.

Barnwell moved to Tennessee in 1985, but returned in 1998 to find open-heart surgery well established in New Bern at the Craven Regional Medical Center. Today, he is on that hospital's board and is proud to observe, "Pitt is doing well, but we are also doing well." Remembering the 1960s when neurosurgical and difficult orthopedic cases had to go to Duke or Chapel Hill, he is grateful for the presence of tertiary care in eastern North Carolina.¹⁹

The Introduction of Minimally Invasive Procedures

Beginning in the early 1990s, newer and less invasive surgical techniques were introduced into the eastern part of the state. Future generations will likely consider the pioneering work in minimally invasive surgery and particularly the robotic surgery that is currently underway at ECU to be milestones in medicine. Minimally invasive procedures were applied first to abdominal surgery, then to vascular surgery, and most recently to cardiac surgery. Dr. Ira Hardy predicts that within a few years, minimally invasive stereotactic neurosurgery will be available in Greenville.

In 1993, Dr. John Hale of Pitt Surgical PA began laparoscopic colectomy, and paved the way for participation six years later in a National Cancer Institute study. Under the leadership of Dr. William Chapman of ECU's Department of Surgery, investigators are comparing the long-term results of laparoscopic and open surgery with regard to cancer survival and cancer recurrence.²⁰

During the mid 1990s, vascular surgeons also began to use minimally invasive techniques. Dr. David Deaton, who had participated in the first FDA-approved endovascular repair of abdominal aneurysms at UCLA's Center for Health Sciences, helped bring the Phase II clinical trial of this procedure to PCMH, where North Carolina's first endovascular surgical suite was set up. Greenville was one of

20 sites nationally, and the only one in the Carolinas, to participate in this trial. In November 1996, surgeons at ECU performed North Carolina's first three endovascular grafts to repair abdominal aortic aneurysms.²¹ Two and one half years later, a 73-year-old patient presented with a life-threatening thoracic aneurysm. Because of her poor condition, the patient was not a candidate for traditional surgery. Dr. Deaton and Dr. John Moran performed the first thoracic endovascular graft in North Carolina.²²

Meanwhile, cardiothoracic teams in eastern North Carolina were developing minimally invasive procedures to repair the heart itself. "We were all trained to use large incisions for safety and access," notes Dr. W. Randolph Chitwood. Nevertheless, he had wondered about the possibility of endoscopic heart surgery for many years.²³ In 1996, Dr. Chitwood led the team that performed the first video-assisted mitral valve replacement in the United States. To date, over 200 of these procedures have been carried out.

Dr. Joseph Elbeery of ECU's Department of Surgery performed North Carolina's first minimally invasive, direct coronary artery bypass (MID-CAB) in 1996. The procedure significantly reduces postoperative discomfort and allows patients to leave the hospital two to three days after surgery. As the chances of surviving bypass surgery increased, investigators looked for ways to lessen other complications. In 1999, the Department of Surgery at ECU joined Wake Forest University/Baptist Medical Center in a study aimed at reducing the incidence of brain injury during bypass surgery.²⁴

In 1999, Dr. Sam Atkinson of ECU's Department of Obstetrics and Gynecology introduced to ENC a minimally invasive surgical procedure (transvaginal taping) to treat stress incontinence. Dr. Atkinson was one of a few gynecologists nationwide trained to perform this procedure, which was approved by the FDA in 1998.²⁵

Minimally invasive techniques are moving into other areas of surgery as well. Just one year ago, Dr. Rosa Cuenca began using radioguided, minimally invasive parathyroidectomy to correct hyperparathyroidism. This 30-minute procedure replaced an operation that could last up to three hours. The radioguided procedure offers a viable treatment alternative for elderly patients who would be poor candidates for traditional surgery.²⁶

Minimally invasive surgical techniques have made phenomenal progress over the past decade, in part because of important contributions by surgeons at ECU. During the year 2000, however, ECU surgery entered a whole new era when Dr. Chitwood and his team received FDA approved for a trial of the da Vinci robotic technique. On May 3, 2000, for the first time in North America, Drs. Chitwood, Elbeery, and Wiley Nifong used robotic surgery successfully to repair a mitral valve.²⁷ They have since performed 35 cardiac procedures by inserting three robotic arms into the chest through dime-sized incisions. The procedure seems almost

miraculous. The robot's electronics filter out all natural tremor from the surgeon's hands, and the magnified images on the screen make tiny anatomical structures like papillary muscles look like "giant Sequoia trees." Chitwood says that looking at the screen totally immerses him in the operative site. The robotic equipment virtually removes the obstacle of the chest wall, and the microhands refine the movements of larger human hands. Ensconced at the console, the surgeon feels as if he is putting his hands right inside the heart.²⁸

In July, 2000, just two months after the first robotic valve repair, PCMH became one of five hospitals in the country approved by the FDA to use da Vinci in general surgery. Drs. Nifong and Chitwood are the principal investigators for a multi-center FDA trial of robotic surgery. They have trained more than 140 surgeons in robotic technique, and Dr. William H. Chapman, general surgeon at ECU, has used robotics in over 100 splenectomies, adrenalectomies, and cholecystectomies.

Surgical Teams—The Way of the Future

Increasingly, teamwork has become a theme in surgery, but a glance into 19th century history of the region shows that the profession has long depended on skillful collaboration. In 1877, the Transactions of the Medical Society carried the two reports of the first North Carolina uses of Joseph Lister's antiseptic method. Both reports came from Wilmington, so they are of particular interest in the present context. Dr. W. W. Lane reported enthusiastically about the good results he achieved using Lister's methods during an amputation. The second report, by Dr. DeRosset, gives a revealing glimpse into the operating theater as Lister's method was used during an ovariectomy. The surgeon had eight assistants: "one for ether, two for manipulating the abdomen and body, one for instruments, two for carbolic sprays, besides two nurses for handling warm water to keep the hands clean."²⁹

Creative collaboration among professionals, not only to address unusual situations but to improve routine services, is as necessary today as it was 100 years ago. For example, nowadays most cases of pulmonary stenosis are discovered and corrected during childhood, but in January, 1999, a 65 year-old patient from Tarboro was diagnosed with pulmonary stenosis and in desperate need of valvuloplasty. No balloon catheters were large enough to perform this procedure on an adult, but Dr. Michael Miller, an adult cardiologist, and Dr. Michael McConnell, a pediatric cardiologist, combined their expertise. By introducing and simultaneously inflating two balloons in the diseased valve, they successfully repaired the defect.³⁰

In an even broader kind of collaboration, surgeons at PCMH are currently working with nurses and other staff members to make operating rooms more efficient. The pediatric "blitz team" (one of four at the hospital) identified

a number of things that made pediatric surgery more complicated than it needed to be. This group of nine people developed ways to make the surgery environment more comfortable for young patients by improving the setting. Simple interventions such as providing room for parents in the peri-operative areas, pediatric gowns in the Emergency Department, and soothing interior design themes make an real difference for pediatric patients undergoing surgery.³¹

Then and Now: An Historical Perspective

The last third of the 20th century brought striking changes to the practice of surgery in eastern North Carolina. We have seen dramatic innovation not only in surgical technique but also in new patterns of referral and delivery of surgical services. A few historical comparisons illustrate these developments. One example comes from urology and the other from trauma surgery.

During the 19th century, Dr. Caleb Winslow of Hertford was a very well-known and respected surgeon practicing in Perquimans County in northeastern North Carolina. Bladder stone was a problem for which Dr. Winslow's expertise was repeatedly sought, and he was good. His record of only one death in 99 consecutive lithotomies with only one death was for a long time the best in the world.³² Today, bladder stones are rare, but kidney stones are not. There are no surgeons practicing in Perquimans County today, but modern lithotripsy services are available at Albemarle Hospital in adjacent Pasquotank County. In the many areas with no resident urologist, care literally comes to the patient in the form of mobile lithotripsy units.

Social and economic factors discourage primary care providers from practicing in rural areas.³³ The facilities, specialized equipment, and highly trained staff needed to support modern surgery make the challenge of providing service even greater. Nevertheless, changes are occurring that promote access to surgical care. A general practitioner in Hyde County reports that some years back he used a sterilized hacksaw blade to amputate a farm boy's finger because no bone saw was available.³⁴ Since 1985, PCMH's EastCare helicopter means that doctors are less likely to have to "get by" with inadequate equipment. Surgeons or patients can be transported by helicopter as the situation requires. For example, Dr. Paul Cunningham rode a helicopter from the medical center in Greenville to Pink Hill where he performed a life-saving amputation on a patient whose fingers were trapped in heavy machinery.

In 1981, when Dr. Cunningham began practicing surgery at the 50-bed hospital in Windsor, it seemed to him that everything could be done right there. Dr. Arthur Bradsher who had spent his career in the community, could deliver babies, set fractured hips, and carry out complex abdominal and non-cardiac thoracic surgery. The only challenging cases

were those requiring prolonged intensive care or specialized equipment that the small hospital could not afford. Twenty years later the technological costs of surgical care have become prohibitively expensive for small hospitals. Clinical acumen and surgical expertise are no longer the determining factors. Appendicitis, for example, formerly diagnosed by physical examination and recognition of subtle clinical signs, is now likely to be diagnosed by computerized tomography. Now, although the population of Bertie county has remained constant, the hospital in Windsor has shrunk to six beds and been converted to a "Critical Access Hospital."

Challenges and Future Directions

Health care teams working at regional medical centers continue to contribute in unique ways to the history of surgery, but adequate distribution of surgical services in eastern NC remains a challenge. Dr. Walter Pories estimates that this "29 county region with a population of 1.2 million should have 120 general surgeons, according to the accepted formula of one surgeon for every 10,000 people. Instead, we have 95." He underscores this 21% shortfall by pointing out that it is a national trend. "There has not been an increase in the number of graduating chief residents in surgery in spite of the rise in the US population and the increased breadth of the field." The shortage of surgeons will be acute in rural eastern NC, Pories predicts, because "small regional hospitals find it difficult to support the sophisticated technology now required for even an average surgical practice." In addition, he observes, "We no longer train general surgical residents to be Lone Rangers who can do it all but instead produce specialists who lead teams."³⁵

Dr. Chitwood agrees about the shortage of general surgeons for rural community practice. He believes that we can relieve the shortage by enhancing primary care training. "The primary care doctor does need some intensive training with surgeons, with gynecologists, with critical care doctors, with emergency room doctors" in order to offer a high level of ambulatory care. Chitwood advocates longer primary care residencies of improved quality and rigor. A highly trained family doctor who has spent time in the Emergency Department and can distinguish, for instance, a straightforward fracture from one that involves nerve entrapment. The same doctor can recognize cases that can be competently handled in a rural health care setting and those that need referral to a specialist. Patients who have confidence in their doctors will be likely to contact those doctors rather than rushing straight to a regional trauma center. Chitwood believes that ideal health care will require having qualified primary care doctors dispersed throughout the region—doctors who will be able to accurately evaluate and know whether to treat the patient at home, or in the local hospital, or to send the patient to a tertiary referral center for highly specialized care.

When asked about the prospects for surgery over the next 25 years, Chitwood says it will be less invasive and increasingly used as an adjunct to other procedures: "Medical therapy and surgical therapy will be added together either at the same time or in series." He envisions surgery becoming more and more technologically driven because scientists continue to develop alternatives to tying sutures in the traditional way. For example, specialized clips, ultrasonically welded polypropylene sutures, or biological glues will be features of future surgical intervention. We may see the insertion of radiation seeds or new genes, but for certain surgery will evolve to a much more complex level, and subspecialties will merge and redefine.

Dr. Chitwood warns, however, that the challenge is to not lose sight of the basics in the pursuit of rapid technological advances. He emphasizes that surgeons must be facile with open gallbladder operations even after they have done 1,000 endoscopic procedures. He predicts of surgical training, "It's going to be fantastic!" Virtual operation trainers will mean that when surgeons do their first real operations, it will be much less "nerve-wracking" than in the past. The kind of teamwork among surgeons, radiologists, and internists that has allowed surgery to progress in recent years will become even more important. Dr. Chitwood notes, however, that "Physicians are used to making highly important decisions on their own, independently." In spite of the interpersonal challenges engendered by this habit, strong collaborative relationships must continue to evolve.

Another challenge to the surgical profession is dealing with public expectations. A patient in 1961 might have accepted a 15-20% mortality rate from an operation, but today patients might expect 1-5% mortality. In an age of increasing technological complexity, Dr. Chitwood believes that the appropriate response to this challenge has two parts. First, doctors must communicate the medical situation clearly to the patient and the family. Secondly, doctors should seek inspiration in the writings of great physicians of history. In particular, he recommends that surgeons study once again the work of William Osler so that they might be inspired to nurture better physician-patient relationships.³⁶

Dr. Barnwell is among those concerned that social and economic pressures promote a mercenary attitude among surgeons. "There is still an opportunity, a window, to expand the care and compassion part of medicine that has been traditional for centuries. If we can explore that, then I think we're going to be pretty well off in 20 years. . . . We need to get away from academia and look at the world at large. . . .

The poor health, economics, and environment—they're there, and I think that we educated people need to look at that [apart] from our chosen profession. How can we in small ways address those big problems? . . . Surgeons first are human beings, and there are human problems out there."

Dr. Barnwell, from the vantage point of his new position as medical director of the Craven County Health Depart-

ment, is looking at how to address chronic diseases within the black community.³⁷

Surgical services at the Brody School of Medicine and PCMH have evolved to the point of making real contributions to national and, indeed, to global health. Financed by *Samaritan's Purse*, for example, two 10-month old Mongolian boys came to Greenville in August of 2001 for surgical repair of congenital heart defects.³⁸ But health care providers and administrators throughout eastern NC continue to wrestle with how best to provide adequate health care for residents of the 29 counties. It is difficult to predict how the network of care that is developing in the area will evolve. Predictably, technological advances will affect the management, control, and treatment of current disease states, but will also influence

the relationship of patients to their surgeons. The concept of community may take on new meaning; the term "network" may come to indicate a continuum of electronic connectivity throughout the region. In the face of this, the challenge for each surgeon will be to discover not only how develop skill and dexterity, but how to personify the human elements that have long characterized role-model surgeons—the ability to comfort and to offer hope.

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Pediatric Health Care in Eastern North Carolina, 1976-2001

Jon B. Tingelstad, MD

In Eastern North Carolina 25 years ago, primary medical care for infants, children, and adolescents was provided by pediatricians, family practitioners, and by the staffs of health departments. Patients who required inpatient care were admitted to local community hospitals, none of which had more than 200 beds. When more complex levels of care were required, pediatric patients were transferred to North Carolina Memorial Hospital in Chapel Hill, Duke Medical Center in Durham, or Kings Daughter's Hospital in Norfolk, Virginia.

The Early Private Pediatricians

Eastern North Carolina was fortunate to have several excellent pediatricians (see box), but their numbers were too small to provide clinical services for all the region's children. These dedicated doctors, in addition to providing exemplary patient care, served their communities, state, and nation well. Dr. Trevathan was and remains a strong advocate of the environment, and has participated in many state agencies. Dr. Tayloe was a leader in the North Carolina Pediatric Society, and worked tirelessly to improve Medicaid services for children. Dr. Reynolds was actively involved with the early phases of the North Carolina Medical Mutual Insurance Company.

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Building a Department of Pediatrics

Over the past quarter century, the Department of Pediatrics at the Brody School of Medicine at East Carolina University has had a significant impact on the health care of eastern North Carolina's pediatric patients through education, clinical services, and research. William Laupus, MD, who was

appointed Dean of the new four-year School of Medicine in 1975, was the first Chairman of the Department of Pediatrics. At the recommendation of the Liaison Committee on Medical Education, he relinquished the latter position in 1977 and I was selected as his successor. Confronted with an enormous challenge but a wonderful opportunity, I set out to recruit faculty who were



Faculty, Department of Pediatrics, East Carolina University
School of Medicine, 1980

excellent clinicians and teachers and to identify a patient population. Initially, facilities were rather spartan. I examined my first pediatric cardiac referral patient on a cleared-off desktop in Ragsdale Hall on the University's main campus. Subsequently, James Jones, MD, of the Department of Family Medicine, provided space for a pediatric clinic in his department's "doublewide," located on the grounds of Pitt County Memorial Hospital on West 5th Street.

Because of the very high infant mortality rate in eastern North Carolina, it was essential that we recruit a neonatologist. Verbena Sugg, MD, accepted the challenge, and in 1978 she was assigned two or three beds in the newborn nursery of the Pitt County Memorial Hospital on Moye Boulevard. Dr. Sugg worked endless hours, often to the point

An Honor Roll of Pediatricians from Eastern North Carolina in the Mid-Seventies

Rufus Herring, MD	Clinton	Graham Barden, MD	New Bern
Fletcher Harrell, MD	Elizabeth City	Hovey Aiken, MD	New Bern
Art Chesson, MD	Goldsboro	Charles Hunsinger, MD	New Bern
James Morris, MD	Goldsboro	Boone Grant, MD	Rocky Mount
Earl Trevathan, MD	Greenville	Bob Sheridan, MD	Rocky Mount
Ben Shappley, MD	Greenville	Victor Herring, MD	Tarboro
Fred Haar, MD	Greenville	David Tayloe, MD	Washington
Malene Irons, MD	Greenville	Frank Stallings, MD	Washington
Alex Tse, MD	Jacksonville	Frank Reynolds, MD	Wilmington
Charles Martin, MD	Jacksonville	Henry Hawthorne, MD	Wilmington
William Keiter, Sr., MD	Kinston	Charles Hicks, MD	Wilmington
William Keiter, Jr., MD	Kinston	Bob Pope, MD	Wilson
Orville Reece, MD	Kinston	Ed Thorne, MD	Wilson
John Knelson, MD	Morehead City	Earl Fisher, MD	Wilson
Stan Rule, MD	Morehead City	Sam Ryburn, MD	Wilson

of exhaustion, caring for her patients. She was succeeded by Arthur Kopelman, MD, who recruited an excellent group of neonatologists. Adding a growing number of superbly trained nurses and other support staff, and the construction of a new and expanding unit, led to a significant decrease in the mortality and morbidity risks of many severely ill premature infants and those with congenital malformations.

We also emphasized the recruitment of excellent general pediatricians. The stature of the burgeoning department was enhanced by the hiring of James Markello, MD, Robert Dillard, MD, Earl Trevathan, MD, and James Hughes, MD. Initially, it was difficult to identify a cohort of patients to use our clinical services and populate our teaching units.

On a particular Friday morning, Dr. Dillard and our lone (or perhaps lonely) pediatric resident traveled to Grimesland to staff the satellite clinic in the Health Department. Only one patient was scheduled, and you can be certain that child was given a comprehensive evaluation. Theodore Kushnick, MD, succeeded Malene Irons, MD, (herself an icon) as Director of the Developmental Evaluation Clinic. He also started the genetics program, and established a cytogenetics laboratory for the School of Medicine. Another "early pioneer" in the Department of Pediatrics was North Carolina native Tate Holbrook, MD, who began in the Hematology/Oncology Section. Jean Kenny, MD, established the section of Pediatric Infectious Diseases.

The two decades following the establishment of the Medical School at ECU have seen significant progress and

growth. The Department of Pediatrics now has 47 full time faculty members—expert clinicians, superb teachers, and productive researchers. In addition to general pediatrics, they represent the subspecialties of allergy-immunology, adolescent medicine, cardiology, critical care, endocrinology, gastroenterology, genetics, hematology/oncology, infectious diseases, neonatology, nephrology, and rheumatology. Two pediatric surgeons have also been added to the Department of Surgery faculty. In May 2000, Ronald Perkin, MD, succeeded me as Chairman of the Department of Pediatrics.

The pediatric and medicine/pediatric resident training programs have grown significantly, and the graduates of these programs have contributed importantly to the improvement of pediatric health care across the state and country, but especially in eastern North Carolina. Lorrie Basnight, MD, directs the three-year pediatric residency program, which accepts 10 new residents each year; Dale Newton, MD, directs the combined medicine/pediatrics residency, which enrolls six new residents annually in its four-year program. Twenty-six graduates of the two residency programs are either currently practicing or have practiced medicine in eastern North Carolina.

Pitt County Memorial Hospital

In 1976 Pitt County Memorial Hospital (then located on West 5th Street in Greenville) had a capacity of fewer than



Faculty, Department of Pediatrics, East Carolina University
School of Medicine, 1999

200 beds, 10 to 12 of which were designated for pediatric patients. The unit was closed briefly at times during the summer months because all patients had been discharged. There was no neonatal intensive care unit and no pediatric intensive care unit. There was not even a respirator suitable for pediatric patients. All critically ill patients were transferred either to North Carolina Memorial Hospital in Chapel Hill or to Duke Medical Center in Durham.

Much changed after the new 355 bed Pitt County Memorial Hospital opened in April 1977 and became affiliated with East Carolina University School of Medicine. Approximately 24 beds were designated for pediatric patients, and two beds in the newborn nursery were reserved as "neonatal intensive care" beds. At an early meeting of the Regional Perinatal Committee, a pediatrician from a neighboring community said, "Does this mean I will be referring my patients to ECTC (East Carolina Teachers College, the former name of East Carolina University)?"

Over the ensuing 25 years, exciting and expansive (perhaps explosive) changes have occurred at Pitt County Memorial Hospital. On July 1, 1978, a 33-bed neonatal intensive care unit was opened; in February 1985 a new pediatric intensive care unit was constructed on 2 West; in 1986, the "hospital within a hospital" concept was adopted for the pediatric units, and they were designated as the Children's Hospital of Eastern North Carolina. That same year, the Department began its participation in the Children's Miracle

Network Telethon, and raised over \$65,000. On June 20, 1987, the Ronald McDonald House, a "home away from home" for patients and their families, was opened. A new, 12-bed pediatric intensive care unit was completed in February 1995. October 1995 saw the opening of an evening urgent care service for children outside of the Emergency Department. On May 24, 2000, ground was broken for a 50-bed neonatal intensive care unit, which will cover more than 43,000 square feet and cost nearly \$16 million. The new unit, to be completed in early 2002, will have secluded space so that parents can help care for their newborns with medical staff readily available nearby. When the unit is completed, the total number of beds at Pitt County Memorial Hospital will be 745.

Preliminary discussions have begun regarding a new, on-site pediatric tower to contain outpatient facilities on the lower floors, and inpatient facilities above. Such a plan would improve the utilization of University Health Systems services and focus ECU's continuing commitment to provide the finest care for eastern North Carolina's pediatric patients.

The Health Departments

Many county health departments have been a major source of primary care for pediatric patients, especially for those needing immunizations. But these clinical services are usu-

ally not available between the hours of 5 p.m. and 8 a.m. or on weekends. This often creates difficult situations when the children needed urgent care elsewhere and their medical records are not available. These issues are gradually being resolved with the increasing numbers of primary care providers and by opening new and effective channels of communication.

A New Generation of Pediatricians

In addition to their roles as clinicians, children's advocates, teachers, or researchers, the newer generations of eastern North Carolina pediatricians play important roles in state, regional, and national organizations. Dave Tayloe, Jr., MD, of Goldsboro, has led the North Carolina Pediatric Society, has lobbied extensively in the North Carolina Legislature for children's initiatives, and has recently been selected District IV Chairman of the American Academy of Pediatrics. Charles Willson, MD, has played leadership

roles both in the North Carolina Pediatric Society and the North Carolina Medical Society. Lorrie Basnight, MD, and Dale Newton, MD, are both highly respected in the field of pediatric resident education.

Conclusion

Over the past 25 years we have made substantial progress in providing high quality medical services to the growing number of eastern North Carolina's infants, children and adolescents. This progress has been the result of the untiring efforts of practicing pediatricians, the Department of Pediatrics at East Carolina University's Brody School of Medicine, county health departments, regional hospitals, and other health care providers. But several challenges remain, including the need for a more balanced distribution of physicians and health care providers, and the provision of health insurance to every child, through either private insurance or government sponsored coverage.



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Cardiology in Eastern North Carolina, 1960-2001

Eric L Fearington, MD, FACC, FACP

Before 1960, cardiology involved the diagnosis and treatment of arrhythmias (paroxysmal atrial tachycardia, atrial fibrillation, heart block, and ventricular dysrhythmias), ischemic heart disease (myocardial infarction and angina), hypertension, rheumatic heart disease (acute rheumatic fever and subsequent valvular diseases), congenital heart disease, and congestive heart failure. In eastern North Carolina, most of the care for such problems was provided by general practitioners and internists (some of whom had either special interest in heart disease or some post graduate training in cardiology). This article documents the status of cardiology care in eastern North Carolina on a community-by-community basis. I hope to provide a snapshot of cardiology care in the region rather than a comprehensive historical account.

The names of the cardiologists presented in this paper were obtained from the listings for Cardiology, Cardiovascular Diseases (Internal Medicine), and Cardiovascular Surgery maintained by the North Carolina Board of Medical Examiners, and from the 2001-2002 Directory of the American College of Cardiology. Additional information was obtained by personal communication with physicians and hospital CEOs in each of the communities discussed.

Ahoskie

From 1988 to 1994 on-site Cardiology services in Ahoskie were provided by outreach from the Cardiology Section at Brody School of Medicine (East Carolina University), *Regional Cardiology* from Greenville, and *Carolina Heart* from Greenville. In 1994, Dr. Rony Shammass completed a fellowship in Cardiology at University Medical Center (ECU School of Medicine) and came to Ahoskie to establish his practice. After his arrival, the outreach services were discontinued. At the present time, both transthoracic and

transesophageal echocardiograms are available through his office and Roanoke Chowan Hospital. Nuclear cardiology, stress testing, and diagnostic cardiac catheterization are available on site. Dr. Shammass carries out cardiac catheterization on his patients at Pitt County Medical Center (PCMH), and through this connection provides interventional cardiology services for his patients.

Elizabeth City

Dr. Brown and Dr. Leong, neither of whom is any longer in the area, provided cardiology services until 1990. In 1990 Dr. Lindsey White, a fellowship-trained cardiologist, arrived in Elizabeth City. Under the corporate name of *Eastern Carolina Cardiovascular*, Dr. John Adami, and Dr. Richard Wessel practice with Dr. White. This group provides cardiology services to Kitty Hawk and Edenton as well as Elizabeth City. On-site services include nuclear cardiology, transthoracic and transesophageal echocardiography, renal angioplasty, implantation of pacemakers, diagnostic cardiac catheterizations, and stress echocardiograms

Greenville

Cardiology services were initially provided by internists like Drs. Branch Armstead and Edwin Monroe, and by family physicians. Dr. Earl Travathan provided most of the pediatric cardiology services. In 1963 Dr. Eric Fearington completed his fellowship in cardiovascular diseases and joined Dr. Edwin Monroe in practice. In 1964 Dr. Donald Tucker opened a practice of cardiology. In the mid 1970s, the East Carolina University School of Medicine opened its doors. In conjunction with PCMH, the medical school established a cardiac catheterization service under the direction of Dr. Allen Bowyer, the first section head of cardiology. Dr. Douglas Privette, who entered practice with Dr. Tucker in the late 1970s, was the first privately practicing cardiologist to perform cardiac catheterizations in Greenville.

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Over the ensuing 25 years, cardiology services have exploded in Greenville. Dr. Jon Tinglestad, chairman of the Department of Pediatrics, was the first head of the section of pediatric cardiology. Pediatric cardiology is currently carried out by Drs. Dennis Steed, David Hannon, and Charles Sang. The pediatric cardiology section performs full echocardiographic studies, consultations, and cardiac catheterizations. Dr. Sang and Dr. John Rose also run an adult congenital heart disease clinic. Both adult and pediatric cardiology services have worked closely together to develop the telemedicine service, which provides on-line interpretations of echocardiograms, and cardiac consultations to the remote areas of Eastern North Carolina.

When Dr. Randolph Chitwood joined the faculty of the Brody School of Medicine as chief of the cardiac surgery section in 1984, he set in motion a series of rapid advances in both surgical and interventional cardiology services. In addition to Dr. Chitwood, who is now also chairman of the Department of Surgery, Drs. Mark Williams, Jon Moran, Ted Kutlis, Nicholas Francalancia, Walter Scott, and Joe Elberry constitute the section of cardiac surgery. The section of cardiac surgery has pioneered the mid-left anterior descending coronary artery bypass procedure, and Dr. Chitwood is one of the few cardiac surgeons in the world skilled in the use of the DaVinci computer system used in valve repair. Dr. Clay Burnette began a cardiac transplantation service, but for logistical reasons this was discontinued.

Dr. Allen Bowyer, now in private practice with *East Carolina Heart Specialists, PA*, provides cardiac catheterization, echo cardiology, and stress testing. *Carolina Heart, PA* (Drs. Hakin, Peter Wagner, and Lee Surkin) provides general cardiology services, cardiac catheterization, interventional cardiology, and both transthoracic and transesophageal echocardiology. *Carolina Heart* provides outreach services to Bellhaven, Windsor, Goldsboro, Scotland Neck, Lewiston, Williamston, and Plymouth. Dr. Whitaker of *Carolina Heart* staffs their office in Morehead City. *Coastal Cardiology* (Drs. Douglas Privette, Anthony Christiano, Jerry Simpson, and Gaetano Fontana) provides diagnostic cardiac catheterizations, interventional cardiology, transthoracic and transesophageal echocardiography, nuclear cardiology and stress testing, and outreach services to Edenton. Dr. Eric Carlson, formerly of *Carolina Heart*, has opened a separate practice of general and interventional cardiology.

Drs. Allen Oseroff and Ken Lerrick at *Physicians East* offer diagnostic catheterization, interventional cardiology, transthoracic and transesophageal echocardiography, and stress testing services. *Regional Cardiology* (Drs. Garrett Rogers and Mary Jo Bertsch) offers cardiac catheterization, interventional cardiology, full echocardiography services, stress testing, and outreach services to Washington and Edenton. Dr. David Frazier, who recently began practice in Greenville, gives full electrophysiology testing, ablation, pacemaker and

implantable defibrillator insertions, and tilt-table testing. Dr. Vincent Sorrell is currently serving as interim section head of cardiology, Brody School of Medicine, East Carolina University, following the untimely death of Dr. William C. Reeves on September 19, 2001. The section runs outreach cardiology clinics at Duplin General Hospital in Kenansville.

Drs. Joseph Babb, Pabita Saha, and Michael Miller provide interventional services. Dr. Reyhan Mamud established the first electrophysiology lab in the Greenville area, and Dr. Harry DeAntonio currently provides electrophysiological services. Dr. Vincent Sorrell is in charge of the echocardiography and assists with nuclear cardiology. Dr. Eric Fearington, director of electrocardiographic services, is involved in general, non-invasive cardiology duties. Dr. Assad Movahed serves as the nuclear cardiologist and lab director. Dr. Richard Reinhart, Associate Dean for Clinical Affairs, is a member of the section. Drs. John Rose, Andrew Sumner, and Nadim Geloo perform diagnostic cardiac catheterizations as well as a full range of non-invasive clinical duties. Dr. Lynn Orr provides services in clinical cardiology, nuclear cardiology, and echocardiography. The ECU Cardiology service is heavily committed to teaching of medical students, interns, and residents, and it has a three-year, accredited fellowship program.

Goldsboro

The first fellowship-trained cardiologist in Goldsboro was Dr. J.D. Gupta, who arrived in 1974. Now, with Dr. Sathish Kodali, he continues practice under the name *Goldsboro Heart Specialists PA*. Dr. Waheed Akhtar recently moved his practice to the Goldsboro area. Services provided by the cardiologist at Wayne County Memorial Hospital include on-site diagnostic cardiac catheterizations, nuclear cardiology, transthoracic and transesophageal echocardiography, and stress testing.

Jacksonville

The first cardiologist in the Jacksonville area was a Dr. Hayman, who established the intensive coronary care unit at Onslow Memorial Hospital. Dr. Andre Tse, the first fellowship-trained cardiologist, began practice in 1976. Dr. Tse was the first Jacksonville area doctor to use Swan Ganz catheterization in patients with cardiogenic shock. Dr. Lakshmi Narasimhan, who joined Dr. Tse in the mid 1990s, brought diagnostic cardiac catheterizations and interventional cardiology to the practice. Dr. Narasimhan has a staff appointment at PCMH in Greenville, where he carries out interventional cardiological procedures (angioplasty and stenting). Dr. Tse and Dr. Narasimhan are both affiliated with ECU Cardiology.

In 1980 Dr. Edgardo Bianchi entered practice, and Dr. Richard Leung arrived in 1993. Dr. Louis Caruso opened a practice in 1999. Dr. Michael JosiLevich practices both cardiology and internal medicine. Services available in the Jacksonville area include stress testing, transthoracic and transesophageal echocardiography, site cardiac catheterization, and nuclear cardiology. Dr. Narasimhan practices interventional cardiology by at PCMH.

Kinston

When Dr. George West arrived in Kinston in 1973, he was the first fellowship-trained cardiologist there; in recent years he has been joined by Dr. Alan Kiollos. In 1977 Dr. Michael King came, later joined by Dr. Shymal Mitra to make up *Kinston Medical Specialists PA*. Services available at Lenoir Memorial Hospital and in the offices of the cardiologists include diagnostic cardiac catheterizations, nuclear cardiology, transthoracic and transesophageal echocardiography, and stress testing using treadmill, echo, and nuclear techniques.

New Bern

In 1962 Dr. John Baggett arrived in New Bern as the first fellowship-trained cardiologist. Later, Drs. David Oliver and George Beckwith followed; they practice together as *New Bern Internal Medicine and Cardiology*. Dr. John McQuade practices at *Coastal Internal Medicine and Cardiology*, and other New Bern cardiologists include Dr. Linda Andrei at *Eastern Carolina Internal Medicine*, and Drs. John Williams, Timothy Garrand, Ashley Stroud and John Gould at *Heart Center Cardiology* (Dr. Gould staffs the office in Morehead City). Craven Regional Medical Center offers a full spectrum of cardiac services, including on-site cardiac catheterization, transesophageal and transthoracic echocardiographic studies, nuclear cardiology, full stress testing procedures, interventional cardiology, and cardiovascular surgery (provided by Drs. Leon Alexander, Michael Halligan, and Christopher Willms).

Morehead City

In 1981 Dr. C.V. Purushothaman, a fellowship-trained cardiologist, established a practice in Morehead City. Within the past several years Dr. Donald Whitaker of *Carolina Heart* in Greenville moved his practice to Morehead City. Dr. John Gould of *Heart Center Cardiology* in New Bern staffs an office in Morehead City. Services available at Carteret General Hospital include both transthoracic and transesophageal echocardiograms, nuclear cardiac studies, stress testing, and pacemaker implantation.

Plymouth

After completing his fellowship in cardiovascular diseases in 1995, Dr. Prakash Tirupattur opened a practice of cardiology in Plymouth; he provides echocardiography, nuclear scanning, and stress testing. Carolina Heart in Greenville also offers cardiac consultation in Washington County.

Rocky Mount

The first fellowship-trained cardiologist in Rocky Mount, Dr. John Puthenveetil, is now semi-retired after many years of active practice and has moved to Roanoke Rapids. Cardiology care is now provided by Drs. Sudhir Prasada, Shalendra Varma, and Maitreya Thakkar (at the *Boice-Willis Clinic*), and Dr. Odematta Sirisena (at *Rocky Mount Internal Medicine*). Procedures available at Nash General Hospital include cardiac catheterization, coronary and peripheral angioplasty, nuclear cardiac studies, and full echocardiographic studies. Both Dr. Pradasa and Dr. Varma have privileges at PCMH in Greenville.

Roanoke Rapids

For many years, cardiology care was provided by Dr. Malapas, a generalist practicing in Roanoke Rapids. Fifteen years ago, Dr. Jose Antony entered into the practice of cardiology; 12 years ago Dr. Natarajan Manickam arrived; and within the past year, Dr. Balla has established a cardiology practice. Cardiology services available at Halifax General are echocardiography, stress testing, nuclear scans, and pacemaker implantation.

Tarboro

Before 1994, the section of cardiology of the Brody School of Medicine provided on-site cardiac consultation. Then Dr. Jayash Patel opened a practice of cardiology at the *Tarboro Clinic*, and ECU Cardiology ended on-site consultation. Dr. Patel performs cardiac catheterizations and angioplasties at PCMH. Onsite diagnostic services in Tarboro include transthoracic and transesophageal echocardiography, nuclear cardiac studies, and stress testing.

Washington

When Dr. Henry Stephenson began the practice of medicine and cardiology in Washington in 1961, he was the first fellowship-trained cardiologist in the city. Now, Dr. Tom Nickelson provides full time on-site cardiology services, and Dr. Lynn Orr provides consultative services. Available at

Beaufort County Hospital are nuclear cardiology studies, transthoracic echographic studies, stress testing, and temporary pacemaker insertions.

Wilson

In the early 1960s cardiac care in the Wilson area was provided by Drs. Will Young and John Lund, two doctors with special interests and talents in cardiology. Subsequently Drs. Dolphin Overton and Allen Whitaker joined Dr. Lund in practice. Available in Wilson are on-site diagnostic cardiac catheterization, transthoracic and transesophageal echocardiography, and radionuclear cardiac studies.

Wilmington

In the late 1950s and early 1960s cardiology care was provided by Drs. Marshburn, Warshauer, and Tidler, all of whom are now retired. Dr. Norman Robinson, also retired, and Dr. Richard Tamisiera were the first two fellowship-trained cardiologists in Wilmington, and Dr. James Snyder was the third. *Wilmington Health Associates* has the following cardiologists: Drs. Damian Brezinski, Linda Calhoun, Robert Everhart, James Harper, Joseph Helak, Adrienne Richards, and Mark Murphy; Drs. Hemantkumar Patel and Praful Patel provide electrophysiology expertise. *Hanover Medical Specialists* has eight cardiologists (Drs. David Sawyer, James Snyder, Peter Wiegman, Martin Conley, William Crafford,

William Holt, Michael Moeller, and Hemal Nayak [electrophysiology]). *Coastal Cardiology* has Drs. Christopher Barber, William Buchanan, Frank Hobart, and Charles Hicks. Dr. Norman Robinson is listed at 6659 Tidewater Lane, and Dr. Abe Walston at 2213 Fox Hunt Lane. Drs. Charles Bay, Kenneth Blanton, Ivan David, Oliver Hunt, Charles Hunter, and Howard Marks provide cardiovascular surgery services. Cardiology services available in Wilmington include cardiac catheterization, interventional cardiology, and cardiac surgery. Electrophysiological testing, ablation, and tilt testing studies are provided. Full radionuclear cardiac evaluations and echocardiographic studies, including stress echo, transthoracic and transesophageal echo, are available. New Hanover Hospital has a teaching affiliation with the University of North Carolina at Chapel Hill.

Over the past 45 years expert cardiology services have become widely available to the citizens of Eastern North Carolina. Cardiac surgery is now available at three medical centers east of Interstate 95. Cardiologists are readily available in most areas of Eastern North Carolina to provide consultative services, non-invasive studies, and to make cardiac catheterization easily available.

Acknowledgments. Special appreciation is expressed to Dr. John McQuade of New Bern and Dr. James Snyder of Wilmington for their editorial assistance. Appreciation is also expressed to Dr. George West, Dr. Richard Young, Dr. Andre Tse, Dr. C.V. Purushothaman, Dr. Ronnie Shammash, Dr. Lindsey White, Dr. J.D. Gupta, Dr. Sudhir Prasada, Dr. John Lund, and Mr. Richard Gilstrap for their contributions.

Cancer Care in Eastern North Carolina, 1975–2000

William F. Bobzien, III, MD

Let me tell you the remarkable story of how cancer care has evolved in eastern North Carolina (ENC) since 1975. For six years, I had the opportunity to observe this from a distance, but since 1981, I have had the privilege of being a direct, though minor, contributor to the process. Picture for a moment the landscape of cancer care here a quarter-century ago. Specifically, try to imagine (I assume you had no direct experience) what it was like to be a cancer patient then. Dr. Dudley Anderson and Dr. Harvey Grode were practicing medical oncology in Wilson, and Dr. Dan Crocker was a medical oncologist newly arrived in Rocky Mount. For ten years, since 1965, Dr. Simmons Patrick, a Duke trained diagnostic and therapeutic radiologist, had had a cobalt based radiation oncology practice in Kinston. Radiation therapy became available in New Bern in 1972. Aside from these few small pockets of care, most patients in the region had to travel to the Duke or the University of North Carolina (UNC) hospitals for any oncology care other than straightforward surgery. This worked a considerable hardship on these patients, many of whom were seriously ill. Radiation and chemotherapy, of their very nature, often require frequent trips or extended residence away from home. And one must remember that in 1975 chemotherapy side effects, particularly nausea, were not well managed. Thus, trips were not only long but also often made in the company of acute symptoms of nausea and vomiting—a decidedly unpleasant prospect. To avoid this, a number of primary care physicians and surgeons in the region functioned as “good soldiers,” delivering some chemotherapy under the direction of physicians at the medical centers.

Contrast then to now. Virtually every major community has access to medical oncologists, either full time practitioners in the community or regularly scheduled visiting physi-

cians. Most communities also have on-site radiation oncology services. Few patients have to travel more than one half hour to get sophisticated oncology care. The accompanying maps (Figs 1 and 2) show a graphic representation of what has happened and give us a better sense of the remarkable changes I have witnessed.

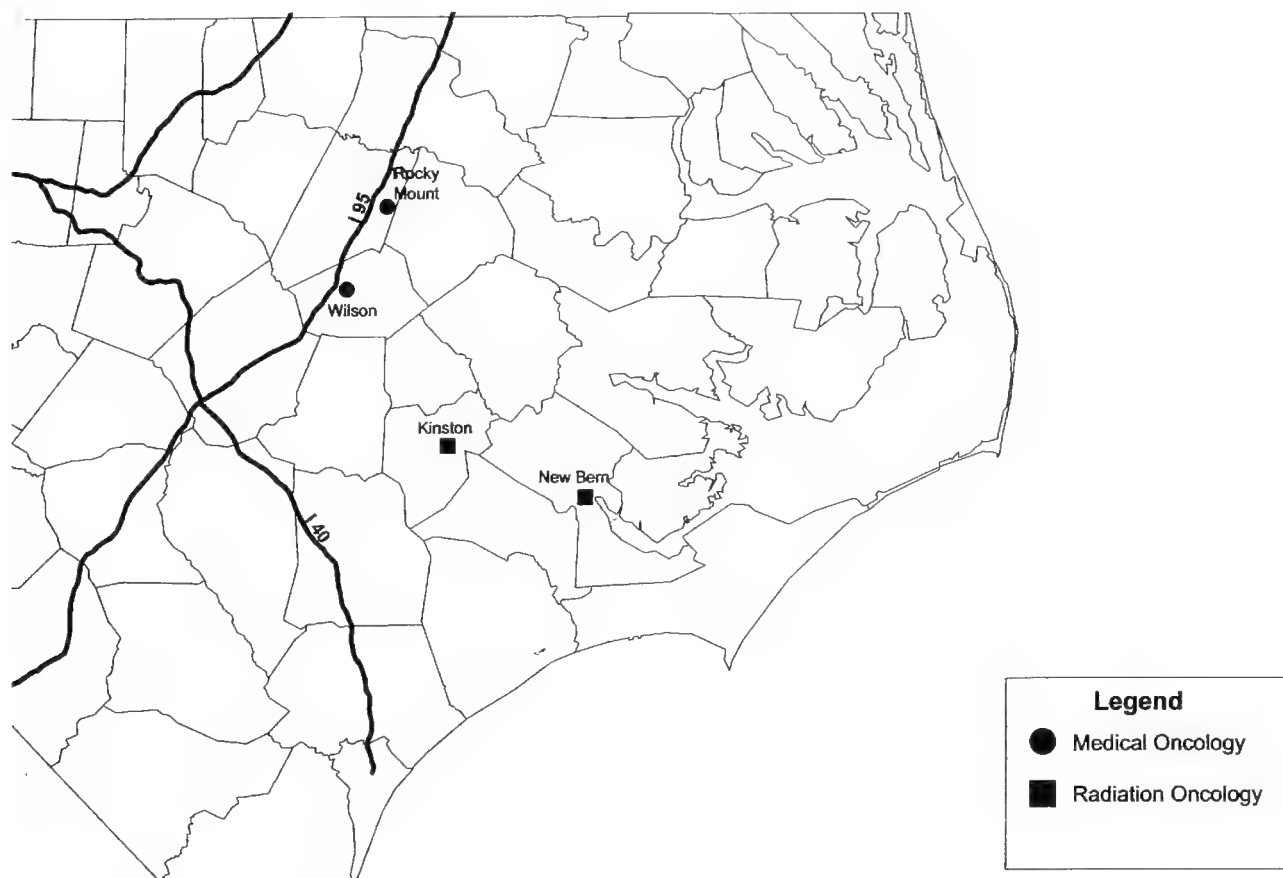
Development of Oncology Care

The progress in cancer care was evolution, not a revolution. It did not happen overnight; it was not the responsibility of any one group of individuals. It grew in an almost organic fashion through the interaction of a number of individual elements. In the 1970s and early 1980s, a number of doctors trained in the oncology specialties came to ENC. Those of us who live and work here know that it is an attractive place. However, people trained in oncology want to practice the same state-of-the-art care they grew up with during their training in medical centers. The techniques can be translated to community practice, but only if the necessary infrastructure is present. That is where the efforts of hospital CEOs throughout the region came into play. The most obvious support was the construction of radiation therapy facilities. When Simmons Patrick brought radiation oncology to Kinston, he had to personally finance the cobalt facility. By the early 1980s, good radiation oncology practice demanded access to linear accelerators whose high costs were underwritten by the commitment of local hospitals.

From a medical oncology point of view, aggressive cancer care is only possible in the setting of access to inpatient nursing services with oncology-certified staff professionals adept at chemotherapy, pain management, and the other nuances of the care of sick cancer patients. Moreover, good care is impossible without the availability of adequate blood bank support and radiographic imaging facilities, including up-to-date computed tomographic (CT) and magnetic resonance imaging. These modalities are commonplace today, but even CT scanning was new in 1975, and it was vision and

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Figure 1. Eastern North Carolina oncology services - 1975



financial commitment on the part of hospital CEOs and large physician groups that brought it to the community. The presence of appropriate infrastructure is what helps to attract and retain providers of quality oncology care.

The initial reference date of our story—1975—is important because of a critical event that occurred that year in Greenville. East Carolina University (ECU) began its medical school. At the time, I was a junior faculty member at UNC. There, the common wisdom was that a medical school in Greenville would be a mistake. Twenty-five years later, the wisdom of the legislators is evident to those of us who practice in the region. The school has provided a focus and a tertiary care resource that has both produced and attracted practitioners to the region. This was certainly the case with oncology care.

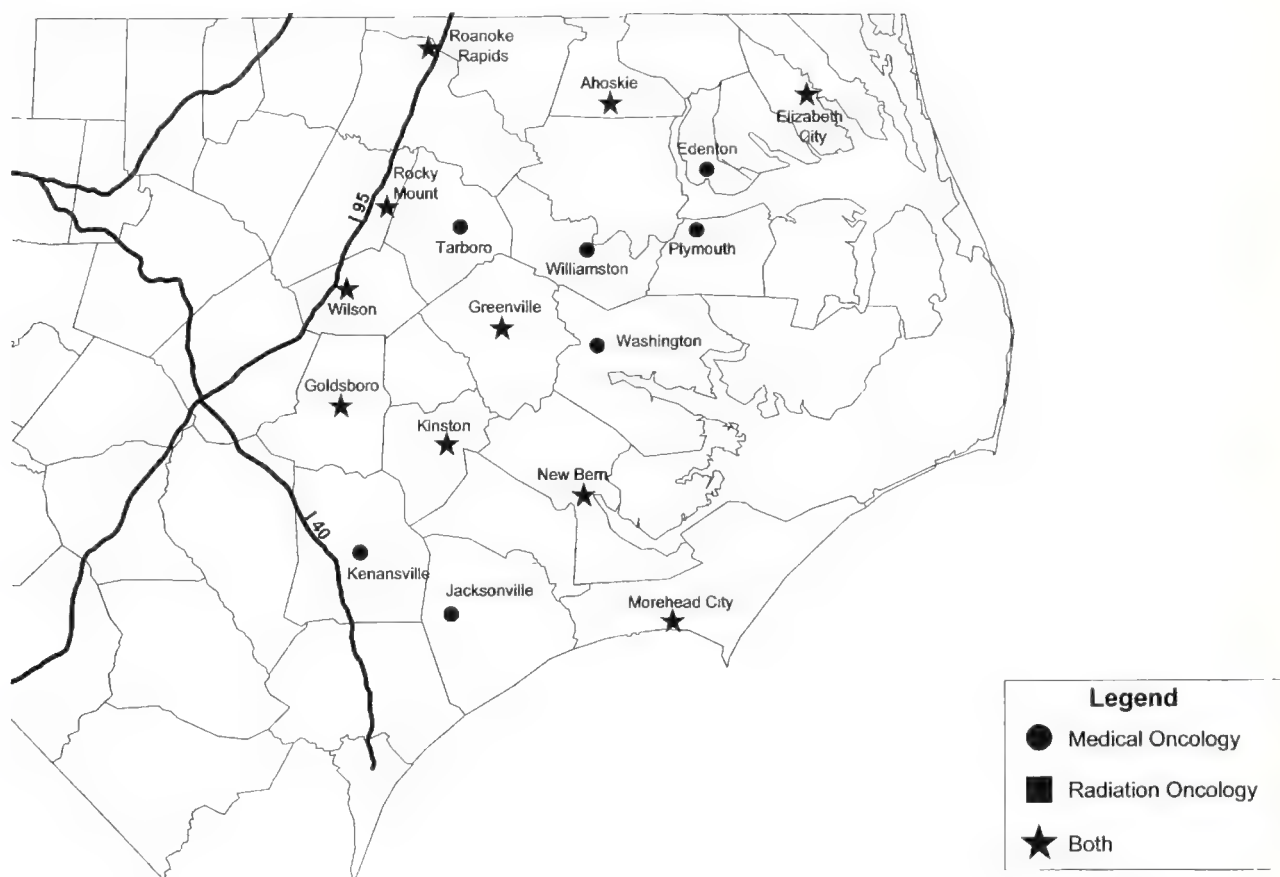
In 1977, Dr. Eugene Furth, the first Chairman of the Department of Medicine, recruited Drs. Spencer and Mary Raab to create and head a section of medical oncology/hematology. Other professionals joined the section, and an academic focal point for oncology care was established. Oncologists will recognize the importance of having this kind of care close to their own practice. It provides a place to

refer patients in need of tertiary care; it provides a source of “second opinions,” and a center for care of patients, such as those with acute leukemia, for whom the community setting is not adequate. The Drs. Raab and their associates served in this role until Spencer’s untimely death in 1993.

In 1994, Dr. Athanasios Anagnostou assumed leadership of oncology/hematology at ECU. He recruited faculty interested in bone marrow and stem cell transplantation, acute leukemias, bleeding and thrombotic disorders, biotherapy/immunotherapy, breast cancer, and thoracic oncology. More importantly, he brought to ENC a vision of a coordinated and comprehensive oncology care network that would assure quality care to all socio-economic groups, an active cancer control program in partnership with the various county Health Departments, and a collegial and cooperative relationship among all the regional oncology providers, regardless of whether they were based in the university, in other regional hospital cancer programs, or in private practice. I will touch on this issue again as we discuss problems and challenges in the future.

The medical school was an important factor, as were the facilities provided by the many hospitals in the area, but

Figure 2. Eastern North Carolina oncology services - 2001



oncology care would not have been possible without the tireless efforts of radiation and medical oncology practitioners in ENC. Both private and university practitioners have provided outreach services to smaller communities. The practices surely derive financial benefit from the care of the patients in these communities, but this "business aspect" is clearly mixed with altruism because involvement in outreach services surely imposes burdens. The accompanying table lists the communities and the practitioners involved in oncology care. I have made every effort to be comprehensive and accurate. If I have missed someone, I offer my apology. The fault is mine.

Challenges for the Future

Congratulations are in order to the many who have contributed to the successes of the last 25 years, but it would be foolish to assume the certainty of continued progress. It has taken us decades to build a system that is sufficiently decentralized yet still allows patients to receive state-of-the-art care within their own communities. However, the convenience of patients is not a primary concern of government and insurance companies in an era of cost containment. More than one proposal has surfaced that would so alter reimbursement as to make in-office chemotherapy or locally delivered radiation therapy impractical. To date the effective voices of the national specialty organizations, the American Society of Clinical Oncology and the American Society of Hematology, have persuaded lawmakers that dismantling the system is ill advised. There is no assurance that this will always be the case.

Dr. Anagnostou and others have sought to foster collegiality and collaboration among the oncology practitioners in the area. However, we still practice to a large degree as individuals, not asking for or receiving the benefit of the expertise and insights of our colleagues. In part this is because of the distances that separate us. In this new century, oncology will become a much more complex specialty as we seek to integrate a broad menu of possible interventions. There is much hope that some newer modalities of therapy will lead to the "cure" of more cancers. Precision in our interventions will become critical, and easy access to our colleagues will be imperative. Fortunately, the Area Health

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Table. Oncology physicians and year of earliest service by community

<i>Community</i>	<i>Medical Oncology</i>	<i>Year</i>	<i>Radiation Oncology</i>	<i>Year</i>
Roanoke Rapids	Mahendra Patel MD	1983	Chanchamma Thannikkary MD	1988
Rocky Mount	William Bobzien MD** (Boice-Willis Clinic) Daniel Crocker MD John Huffman MD Pamela Lepera D.O.** (Boice-Willis Clinic) Rob Wehbie MD	1975	Frederick Ellwanger MD	1983
Wilson	Dudley Anderson, MD Harvey Grode MD	1966	John Reilly	1999
Goldsboro	James Atkins MD John Inzerillo MD	1983	Rachel Chou MD Kevin Kerlin MD	
Ahoskie	Thomas Lee MD*	1989		
Tarboro	Daniel Crocker MD* Walter Quan MD**	1981		
Greenville	Jorge Abdallah MD Thomas Chaplinski MD Thomas Lee MD ECU Physicians**	1977	Gordon Koltis ECU Physicians**	
Kinston	Peter Watson MD	1988	Michael Sorenson MD	1965
Williamston	Jorge Abdallah MD*	1998		
Washington	Jennie Crews MD** Mary Raab MD**	1988		
Jacksonville	Lyndon Kim MD**	1991		
Edenton	Thomas Chaplinski MD*			
Plymouth	Jorge Abdallah MD*	2000		
New Bern	Anna Faidas MD Bonnie Goodwin MD	1985	Christopher Phillippart MD Sahar Rosenbaum MD	1972
Morehead City	Anastas Provatas MD**	1986	Roger Howland MD	1997
Elizabeth City	Daniel Atienza MD* Valiant Tan MD*	1992	Gloria Frelix MD	1990

*Private Practice Outreach

** ECU Physicians

MEDICAL ONCOLOGY

Atanasius Anagnostou MD	Pamela Lepera DO
Jennie Crews MD	Darla Liles MD
Kenneth Karb MD	Anastas Provatas MD
Lyndon Kim MD	Walter Quan MD
Charles Knupp MD	Mary Raab MD
James Leonardo MD PhD	

RADIATION ONCOLOGY

Ron Allison MD
Ulf Karlsson MD
Gregory Mitro MD
Kalika Sarma MD

GYNECOLOGICAL ONCOLOGY

David Tate, MD
Diane Semer, MD

Education Centers system has the equipment needed to make telemedicine available at virtually all hospitals. ECU has become a leader in this field. But it will take committed time and energy from all of us to make real collaboration a fact.

The increased number and variety of interventions that will become available will need to be adequately tested. Dr. Jim Atkins in Goldsboro is known nationally for the proportion of his patients entered into clinical trials, but elsewhere in ENC participation in clinical trials is less than desirable. This is not just because of the reluctance of fully informed patients to embark on an unproven, even if potentially beneficial, course of therapy. Other issues involve availability of time and the lack of adequate data management infrastructure. These are correctable problems, and increased participation in trials will be essential to the testing of the exciting new therapies.

Finally, we need to be sure that all citizens of ENC have ready access to quality care, including the "best" interventions—prevention and early detection. We are hopefully past the time when lack of funds precluded care of advanced cancers. However, those of us who treat patients with cancer will always prefer to see patients at early stages of their illness when we can hope to have a greater impact on the disease and provide greater benefit to the patient. To do this we need to assure that the population has access to screening and we need to educate patients to use these tools effectively.

A Shared Vision to Reduce Disparities in Regional Cancer Care

Earlier I alluded to the vision for oncology care in ENC developed by Dr. Anagnostou as he rebuilt a Division of Hematology/Oncology decimated by departures or illness. He felt strongly that traditional academic models of cancer care, developed for large urban areas, would fail to fully and appropriately address the needs of a sparsely populated rural region with rampant health disparities. The young medical school at ECU had little in the way of financial resources to allocate in any one particular area. Only a coordinated effort by the cancer care providers in the region would allow us both to offer quality cancer care close to home and to assure that enough patients were referred to the medical school to develop programs for treating uncommon cancers or helping patients who needed complex care. Dr. Anagnostou invited all regional oncologists and hospital administrators to become equal partners in this effort and take responsibility not only for their own communities, but also—by using their collective wisdom, expertise, and good will—help identify and address the cancer care needs of the entire region. He organized monthly evening conferences for all regional cancer care providers and their staff. These meetings provided not only continuing medical education but also a forum for

public exchange of ideas and honest dialogue. He convened region-wide meetings of hospice and home care nurses and pharmacists to encourage a better understanding of cancer patients' home needs. He helped smaller regional hospitals recruit the medical oncologists who today live and work in those communities, and he offered those doctors strong medical school support for their academic needs. To further the vision of better coordinated cancer care, he and Carteret General Hospital CEO, Mr. Fred Odell, made a proposal (recently funded) to the Duke Endowment for a community-based regional cancer network. In August 1995, in conjunction with Ms. Wanda Sandele and Mr. Bill Burgess, directors of Craven and Carteret health departments, he started the East Carolina Cancer Coalition. This coalition of regional county health directors and a representative of the American Cancer society met monthly over lunch in New Bern (occasionally in Greenville) to identify needs and help local health departments and other care-givers in early cancer detection and prevention. Through his membership on the North Carolina Advisory Committee for Cancer Coordination and Control, he lobbied tenaciously and successfully to fund a program in five counties (Carteret, Beaufort, Craven, Jones, Pamlico) to implement at the local level the recommendations of the State Control Cancer Plan.

Dr. Anagnostou left North Carolina in November, 2001. To date, his vision of reduced fragmentation of cancer care in the region remains largely unfulfilled, although still very possible. Individual self-interest, a desire of individuals to protect their "turf," and some bureaucratic inertia have made it difficult to implement the needed changes in the near term. The building of a shared vision takes time and continuous nurture, but it is worth it. Insofar as it remains patient-proactive and consistent with the goals to which all of us involved in cancer care ascribe, and insofar as it is based on an open and honest dialogue and commitment, trust and mutual respect among regional partners, it is still a laudable and "do-able" vision towards whose goals we should all continue to strive.

In summary, cancer care in Eastern North Carolina has made great strides over the last generation. Cancer care is about to become an even more exciting specialty holding greater promise for the treatment of our patients. With effective input from government agencies, increased collegiality, attention to clinical trials, and assuring ready access to quality care to all our fellow citizens, the person who writes in 2025 will be able to describe and celebrate successes and progress to equal those of the last 25 years.

Hospital Care in Eastern North Carolina

Responsiveness, Flexibility, and Bottom-Line Finances Keep Rural Centers Vital

Marion P. Blackburn

At one time, outside forces drove hospital development in eastern North Carolina. The federal Hill-Burton Act in 1946 fueled tremendous growth throughout the region by helping consolidate small clinics into comprehensive county hospitals. Now the availability of sophisticated technology, advanced testing procedures, wellness programs, and focus on outpatient care are transforming these rural hospitals into medical centers that provide medical care in an area once considered too poor, too uneducated, and too isolated to support it.

Signs of growth are abundant. Existing hospitals are expanding, renovating, and acquiring new equipment. Bertie County opened a modern, new hospital in late 2001, and a new, 19-bed hospital with emergency and obstetric services is set to open in Nags Head in 2002, both part of Greenville-based University Health Systems of Eastern North Carolina.

Yet all is not growth. Since 1980, hundreds of hospitals across the nation have folded, and eastern North Carolina has lost four. Pungo District Hospital in Belhaven filed for bankruptcy protection in August 2001, and million-dollar losses at Onslow Memorial have forced officials there to rethink priorities.

Technology alone does not cure patients, and solvent hospitals won't help them get better. Hospitals rely on doctors to staff them. It is the dedication of doctors and other health professionals, and their commitment to live and work in this region, that has transformed a once-bleak health care picture in eastern North Carolina. Careful management of resources has preserved hospital vitality in harsh economic conditions and led to more effective ways of operating. Less expensive alternatives to traditional inpatient care—day surgery, telemetry, home infusion, advanced diagnostics, reha-

bilitation—help make the care of people more efficient and have been generally well received by patients.

Old Values, New Skills

While holding onto its traditional values—hard work, mutual support and strong family ties—eastern North Carolina has moved quickly into the technological age of medicine. It's not unusual to find access to advanced services in remote areas. Many community hospitals have access to mobile magnetic resonance (MRI) or computed tomographic (CT) imaging equipment or have their own units.

Breadth of care has also improved. Birthing rooms are the norm, and many hospitals have separate sections dedicated to obstetrics, gynecology, pediatrics, and other women's and children's services. The advanced Neonatal Intensive Care Unit at Pitt County Memorial Hospital supports fragile babies from several hospitals by providing skilled medicine and technology. A number of other hospitals have arranged quick transport of expectant mothers and premature and other newborns with serious problems.

The wellness movement, almost unheard of 20 years ago, has generated hospital-based centers for medically-supervised fitness. Not only are these centers a strong source of revenue, they are an investment in the community's health, reducing the costs associated with lengthy hospital stays. They also serve those with special rehabilitation needs and members of the general public, and even high-intensity athletes. Wellness and fitness are not new concepts, but in a region sometimes called the "buckle of the stroke belt" because of its high rate of cardiovascular diseases, they have particular importance.

Hospitals that do not provide full-time coverage of certain services often share resources with other hospitals, especially the Brody School of Medicine at East Carolina University, which has contributed a large number of specialists, residents, and family doctors to rural and underserved

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areas, as well as peer support, professional development, and help with recruiting. Those that are not linked with the School of Medicine have formed bonds with other hospitals to create an informal web of agreements, affiliations, and referral patterns with fluid boundaries. What emerges is a picture of a region that has made remarkable progress in health care despite poor transportation, poor diet, low education levels, and poverty.

Perhaps the most dramatic upturn occurred when the state legislature, after years of political battles, created a four-year medical school at East Carolina University. This move brought gifted medical faculty to Greenville, creating a nucleus of talent that has become a central marketplace of ideas, innovations and progress. By placing resident physicians in Greenville and in surrounding communities, the school directly raised the total number of medical professionals, and brought advancements to small towns sooner than possible before. The core of faculty directly affected the area by establishing satellite programs in oncology, cardiology, and other subspecialties.

Organized referral patterns developed, along with competing group practices that mirrored the depth and expertise of the medical school. Pitt County Memorial, the Medical School's 735-bed teaching hospital, is the largest state medical institution east of Raleigh, providing multi-specialty tertiary care to the region, with links to hospitals throughout the East.

University Health Systems of Eastern Carolina, based at Pitt County Memorial Hospital, has purchased or leased community hospitals in Ahoskie, Tarboro, Windsor, and Edenton. The organization has also affiliated with hospitals in Kenansville, Belhaven and many other towns to offer physician partnerships, specialty services, and other forms of medical support. Other networks include Community Health Systems (Martin and Washington counties) and Novant in Nash County.

Hospitals designated as Critical Access Hospitals can be reimbursed based on the cost of care rather than by prospective diagnosis-related group (DRG) payment. Small hospitals with many Medicare and Medicaid patients may receive better reimbursement for their services, although critical access hospitals must scale back, trim excess expenditures, demonstrate they're providing essential services, and let larger hospitals take care of more complex cases.

This article will take a closer look at each hospital in eastern North Carolina, a fat crescent that stretches north to Virginia, east into the Outer Banks, south to Morehead City and Jacksonville, and west to Goldsboro, Wilson, and Rocky Mount. A dynamic web of natural beauty, small towns, and sprawling farms, this area hosts some of the most unspoiled areas of the state, but for most of its history has lacked the metropolitan centers to draw a sufficient number of talented doctors. That has changed. More doctors are setting up private practices into growing coastal communities like Wash-

ington, New Bern, Morehead City, Elizabeth City, and Edenton and inland cities like Rocky Mount, Wilson, and Kinston.

North and East Sections

Woodlands, rich primeval swamps, and gently rolling hills distinguish the northeastern edge of eastern Carolina, which economically has been the state's poorest region. Of its 10 counties, five (Northampton, Gates, Currituck, Camden, and Perquimans) do not have hospitals. Halifax, Hertford, Bertie, Pasquotank, and Chowan counties do have hospitals. Originally sparsely populated, these counties now have large numbers of retirees and non-natives.

Halifax Memorial Hospital, Roanoke Rapids (Halifax County). This 206-bed hospital emerged in 1972 from the former Roanoke Rapids Hospital, which opened in 1912. It originally served members of the working community on a "capitation" or monthly fee basis, but that ended during the Depression. Now it operates as a non-profit institution and since 1992 has been independent of county support. It serves Halifax and Northampton counties with acute care services in major specialties and subspecialties including obstetrics, general surgery, family medicine, pediatrics and others. Inpatient and outpatient rehabilitation services are available. The radiology department has a spiral CT scanner (one of the first such units in the state), nuclear medicine, and ultrasound facilities; mobile MRI and lithotripsy are available. A full-time, 14-bed emergency department is staffed by a physician, mid-level practitioners, and nurses.

Halifax County is the state's most financially distressed, according to state officials, and Halifax Regional's patients have many basic health service needs. One survey estimated that one of four households has no indoor plumbing. The hospital's payer mix is 78% Medicare, Medicaid or charity care, and reimbursements are based on 1980s averages. This presents a tremendous financial challenge to the hospital, which focuses its efforts on delivering primary care and treating or stabilizing patients before transporting them to larger facilities.

Radical challenges require rethinking health care, so Halifax Memorial has created the area's first "Health Resource Center in a mall." With 60,000 visitors a month, the mall is a highly visible location. The Center's full-time nurse will offer screening and education about diabetes, obesity, heart care, and other topics in space adjoining retail stores and restaurants. Eventually, doctors and other health-care professionals may offer lectures, presentations, and workshops there.

Roanoke-Chowan Hospital, Ahoskie (Hertford County). This hospital was the first to receive funds through the Hill-

Burton Act, which helped build hospitals in medically underserved areas. Opened in 1948, Roanoke-Chowan continues to hold license number 1, although its original building has been completely replaced with modern wings for acute and progressive care, outpatient and support services.

Located in Ahoskie, a community of about 4,500, this 124-bed hospital has advanced radiology, including CT, and mammograms on site; it has a high-speed communications link known as "teleradiology," which can transmit images for interpretation by radiologists in Greenville, significantly expanding its diagnostic capabilities. Since 1997, the hospital has been part of University Health Systems, an arrangement that has allowed it to expand services in radiology, wellness and telemedicine. The hospital offers lithotripsy for kidney stones, expanded neurology services, rheumatology, and a program for patients with behavioral and medical problems through its Northside Behavioral Health Service. A surgical oncologist has joined the hospital staff.

In summer, 2001, the hospital completely renovated the emergency department, adding 8,000 square feet to help accommodate emergency visits (nearly 17,000 in 1999-2000). The first water birth took place in 2000. The new 16,000-square-foot wellness center in Ahoskie was modeled after ViQuest at Pitt County Memorial Hospital. This medically supervised fitness and therapy center has a lap pool, aerobics center, weight training, massage, sauna and steam rooms, and cardiovascular exercise equipment.

Albemarle Hospital, Elizabeth City (Pasquotank County). Located in the extreme northeast, bordered by four counties without hospitals and facing Albemarle Sound, the 182-bed Albemarle Hospital is a medical outpost serving both northeastern North Carolina and a portion of southern Virginia. Founded in 1914, it moved to its present location in 1960. It is associated with Sentara in Virginia. The Elizabeth City area, like many of the East's coastal communities, experiences a near doubling of its population each summer, and the hospital has more than 200,000 visitors, whose problems range from minor emergencies to heart attacks.

Fifteen years ago the hospital was understaffed and lacked advanced technology, but the hospital has now developed into a modern medical center offering primary, community, and specialty services, and has the technology to provide borderline tertiary services. Services include cardiology, with rehabilitation, heart catheterization, neurology and neurosurgery, MRI, nuclear medicine and lithotripsy. A recent contract with the new YMCA will create a medical-model wellness center, with speech, occupational, and physical therapy and cardiopulmonary rehabilitation. The gastroenterology service has a dedicated GI lab for upper and lower diagnostic procedures, and surgery for reflux disorders (including Nissen laparoscopy). The hospital also offers bone densitometry, respiratory therapy, and pulmonary rehabilitation programs, nutrition and cardiac rehabilitation. Diag-

nostic imaging studies include myelogram, arthrogram, hysterosalpingogram and Doppler ultrasound.

Chowan Hospital, Edenton (Chowan County). In the early 1900s, the Marine Air Corps' Air Station had a base dispensary, or infirmary, which served as the town's hospital. The base (and infirmary) closed after World War II, when the community obtained the 30-bed dispensary building with equipment intact. In 1947 Chowan Hospital opened as the community's first public hospital. It moved in 1950, and again to its present location in 1970. A new wing was added in 1988 to house a skilled-nursing unit, which was the last section to leave the old base dispensary.

The present 111-bed hospital continues to be responsive to the community. In the past few years it has added specialty services like cardiac catheterization, diagnostic radiology, and telemedicine. In 1998, it joined University Health Systems and in April 2001 linked to the Emergency Department at Pitt County Memorial Hospital (PCMH) in Greenville. The emergency department has full-time physician coverage in its six-bed unit. Two-way monitors allow doctors to confer about trauma support while patients await air or ground transport.

Mammograms made at Chowan Hospital are interpreted at PCMH. There is a nuclear medicine unit, CT scanner, mobile MRI, mobile cardiac catheterization and mobile lithotripsy. One of the hospital's distinctions is a top-ranked skilled nursing wing, a 40-bed section for short- and longer-term patients. Innovative approaches, including pet therapy, give it a homey feeling. Some patients move into this section for short-term rehabilitation of a month or less, others come for skilled nursing care. This wing provides transition to home care or to a lower level of care at a nursing home. It offers physical, speech, and recreational therapies.

In spring, 2001, the hospital received one of six "Eden Grants" issued by the state. These grants support converting skilled nursing units to "Eden Alternatives," with a warm, nurturing atmosphere. Chowan Hospital is using its Eden Grant to develop a formal model that can become a permanent aspect of its skilled care facility. The hospital will obtain plants, aquariums, and other accessories to make the section bright and welcoming for residents.

Chowan's biggest challenge for the future is recruitment, to replace a number of doctors who have left the staff over the past year.

Our Community Hospital, Scotland Neck (Halifax County). The name says a great deal about the history of this institution, closely linked to the farmers, elderly, and poor who are its primary clients. The hospital opened in 1948 with 20 beds and two doctors who provided acute and primary care, operated, and delivered babies. During a funding crisis of the mid 1980s, it became squeezed for resources, losing as much as \$30,000-\$40,000 a month. The state Office of

Rural Health initially decided to close the hospital, but the community fought to convert the existing facility, with its 20 licensed beds, as a local emergency care center. They succeeded. The hospital got a Certificate of Need for 60 beds, along with 20 assisted living beds. Suddenly, the community had a doctor's practice, with lab, X-rays, 20 acute care beds, an emergency room, 20 assisted living and 60 skilled nursing beds. There was a price, however. The tiny town of 2,300 people had to raise the money to support its hospital. The townspeople gave nearly \$200,000, and grants from the Duke Endowment, Robert Wood Johnson Foundation, and government supplied the rest. Today, the hospital provides a variety of primary care services, along with some diagnostics. Its assisted living and skilled nursing wings reflect the needs of an aging rural population with limited transportation. In 1995, Our Community Hospital participated in a pilot federal program that led to Critical Access Hospital designation for rural institutions.

Bertie County Memorial Hospital, Windsor (Bertie County). Bertie County, traditionally one of the state's poorest, has experienced new stability due, in part, to concentrated efforts by the East Carolina University School of Medicine, University Health Systems, and Greenville physicians to bring specialty care to its residents. The community hospital, located in Windsor, a town of about 2,000, is a strong example of resilience and adaptability in a difficult rural climate. The original hospital opened in 1952 with Hill-Burton funding, but after several years of declining patient numbers, it closed for a month in 1985 and underwent several turnovers in management. In 1998, faced with losing their hospital, county leaders joined University Health Systems, which provided support for operations and construction. It was clear that to survive the hospital would have to become a lean, modern institution. Applying successfully for designation as a Critical Access Hospital, it moved in September 2001 to a new, state-of-the-art building in Windsor, the first in the nation constructed according to Critical Access Hospital standards. The federal Office of Rural Health Policy has designated it a national model for Critical Access Hospital construction.

In the new building, the hospital's bed number dropped from 15 to six, allowing it to concentrate on same-day services like day surgery, primary care, and emergency visits. Its design reflects this focus: A single large hall leads to the Cashie Medical Clinic (a primary care clinic), emergency area, specialty clinics, radiology, and lab. As in other communities obtaining Critical Access designation, Bertie's medical community and residents have mixed feelings. Some doctors have expressed reservations about having only six beds, as the average daily census has increased in the past two years.

The outpatient specialty clinics are staffed chiefly by medical school faculty and privately practicing physicians from Greenville. The clinical services offered include gastro-

enterology, gynecology, and urology of low to moderate complexity. A cataract surgery program serves the elderly population.

The Middle and Eastern Areas

In the central areas of the crescent, the topography becomes flatter, the climate drier, and the soil sandier. The greater urban development is a mixed blessing, with its housing sprawl, traffic jams, and social problems. Of its 11 component counties, Nash, Wilson, Pitt, Edgecombe, Martin, Beaufort, and Washington have hospitals; Hyde, Greene, Tyrell, and Dare do not. This area hosts some of the larger hospitals: Wilson Memorial has 317 beds, and Rocky Mount's Nash General Hospital has 283 beds. There are advanced cancer and heart treatment facilities, with radiation oncology, heart catheterization, angioplasty, and open-heart surgery available. The largest hospital is Pitt County Memorial Hospital in Greenville, teaching center for the Brody School of Medicine at East Carolina University, and the institutional base for University Health Systems of Eastern Carolina.

Nash General Hospital, Rocky Mount (Nash County). When Nash General Hospital opened in 1971, it was the only all-private-room hospital in the state. It has pursued a course of aggressive growth since then, opening Nash Day Hospital, the nation's first freestanding same-day hospital, in 1984. Rocky Mount Heartburn Treatment Center opened in 1998, the sole center of its kind in eastern North Carolina and one of few in the nation. The Heartburn Center sees about 250 people each year, not just from its six-county referral area but from all over the state and beyond.

Nash General comprises four historic hospitals: Park View Hospital, formerly downtown; the Seaboard Coast Line hospital; the Rocky Mount Sanitarium; and the Memorial Hospital. Efforts to consolidate them began in the mid-1960s, and culminated with the opening of Nash General in 1971. There is a heart center with catheterization and angioplasty, a free-standing rehabilitation center with 23 beds, and an emergency department staffed and equipped for severe trauma. In 1998, a new intensive care unit opened, and plans are under way for a multi-million dollar expansion of surgery and obstetrical areas. Nash General is associated with Novant Health, based in North Carolina's Piedmont section.

In 2000, the Emergency Department had 60,000 visits, a huge number for a hospital this size. In 1995, the emergency area expanded from 5,500 to 23,000 square feet; with 23 treatment rooms, it is one of the largest in the East. Eleven beds are located in a circle around a nurses' station to allow continual contact. In addition, there are four major trauma rooms, six minor emergency rooms, and two rooms for patients with fractured bones. A separate "urgent care" center for non-life-threatening illnesses reduces ED waiting times

and dramatically enlarges the space available for true emergencies.

Wilson Memorial Hospital, Wilson (Wilson County). As the second largest hospital in eastern North Carolina, Wilson Memorial holds a special responsibility for the central part of the crescent. Early on it recognized the importance of diversifying, offering advanced technological services, and seeking financial flexibility when many hospitals were focusing heavily on inpatient services. Wilson Memorial Hospital opened in 1964 as a result of the merger of four existing hospitals, including Mercy Hospital, which had served the African-American community, thus making Wilson Memorial fully integrated when it opened.

In 1986, Wilson reorganized as a nonprofit entity separate from county ownership, one of the first in the state to do so. The reorganization allowed them to develop a nursing home, obtain durable medical equipment, and establish a home health care agency. The private, nonprofit arrangement also allowed it to invest operating funds and borrow money more advantageously. By reshaping its finances, investments and services, Wilson Memorial was able to escape the difficult public battles faced by many county-owned hospitals in the 1990s.

The hospital, renamed Wilson Medical Center, is associated with Wake Med in Raleigh. Its affiliated services fall under a new umbrella organization, WilMed Healthcare. It has 317 licensed beds and provides acute, critical, and emergency care to the community, with primary care satellites around the county and in southern Nash County.

Advanced technical capabilities include heart catheterization, MRI, and radiation oncology. In 1999, Wilson Memorial added a linear accelerator for radiotherapy, obtaining the certificate of need with the help of Nash General Hospital in Rocky Mount. Since then, the radiation oncology program has treated twice as many patients as expected.

In 1998, Wilson Memorial began employing hospital-based family practice physicians, known as "specialists in inpatient medicine" or "hospitalists." The hospital has developed a palliative care unit for people who are near death and who wish to die away from their home. Hospice has allowed many people to stay at home through illness and death, but some are not comfortable and want to protect family members from memories associated with dying in the home.

Pitt County Memorial Hospital, Greenville (Pitt County). The face of health care in eastern North Carolina would be entirely different without Pitt County Memorial Hospital (PCMH) and the Brody School of Medicine. When the medical school opened in the 1970s, PCMH agreed to develop services in its home county and serve as a model, through consulting and training, to the 29 eastern counties.

In the early 1900s, the county was entirely rural. Dirt roads led from fields to markets and nascent downtowns with

few retailers. Hospitalization—a last resort—required traveling long distances by car or train. By the mid-1920s, Greenville had a small hospital; in 1951, with Hill-Burton funds, Pitt General moved to a new building under county ownership. By the early 1970s a one-year school of medicine was operating at East Carolina University, with plans to expand it to four years. Coincident with the opening of the four-year school of medicine, a new hospital building opened in 1977. Construction hasn't stopped since. Today, PCMH has 731 beds, making it the largest hospital east of I-95.

The medical community supported the growth of PCMH at each turn. The 1950s saw the arrival of specialists in internal medicine, neurology, oncology, and other services. By the time the School of Medicine opened, PCMH had 560 active and consulting physicians, including the school's group practice of 300, *ECU Physicians*, the large private practice, *Physicians East*, and the community of private physicians in Pitt and surrounding counties. Physicians have a vital role in this vast network of buildings and programs. PCMH has, in turn, supported the growth of the region.

"The greatest contribution of Pitt Memorial has been to reach into eastern Carolina," said David McRae, former president of the hospital and now CEO of University Health Systems. "Our purpose is to support health care in the region, not to bring it all here. Lending staff, and sharing resources, and even owning hospitals helps us make sure hospital care is available throughout the region and that it is available in the communities where it's needed."

Among PCMH's most significant achievements are its neonatal intensive care unit, Heart Center (home of robotic and minimally invasive heart surgery), and Level I Trauma Center, offering advanced emergency treatment and disaster relief. Another, less visible group of services—a "hospital without walls"—is the network of preventive, diagnostic, and treatment programs based in schools, health departments, doctors' offices, and nearby hospitals. They include the Pediatric Asthma Program, a wellness program called ViQuest, teleradiology, and injury prevention services aimed at reducing car, farm, and other accidents through safety education.

Initiatives to boost medical services to the poor and elderly while reducing the costs associated with their care include *Health Assist*, which provides prescription drug subsidies for the uninsured and those facing hardships from the 1999 flood. Area physicians are asked to take 10 free patients a year, and specialists to provide 20 free visits a year. The Medicaid Demonstration Project targets asthma, infant mortality, diabetes, and other conditions which, untreated, lead to serious health problems.

Pitt Partners for Health, in its sixth year, brings together representatives of the health department, medical school, and churches at monthly meetings. Its Access to Care committee has developed the mobile dental unit, a church-based diabetes screening program, and others.

Heritage Hospital, Tarboro (Edgecombe County). This 127-bed hospital is unique in successfully making the transition to non-profit after nearly 20 years as a for-profit institution. Heritage serves the people of Tarboro, a historic town on the banks of the Tar River, and other farming communities throughout eastern Edgecombe County. Edgecombe General Hospital opened in 1916 as a county-owned hospital succeeding the Pittman Hospital, which had opened in 1901. In 1959, a Hill-Burton-sponsored building joined the Edgecombe General, Bass Memorial, Edgecombe County Home and Sanatorium, and the Milton Quigless, MD, Clinic (named for one of the earliest black doctors in the region). By the early 1980s, however, Edgecombe General was struggling. In 1982, the county sold it to the Hospital Corporation of America, the largest investor-owned hospital system in the nation. A new, modern 127-bed building, named Heritage Hospital, opened in 1985. After a series of reorganizations under HCA, Heritage continued as a private, for-profit enterprise until 1998, when it was purchased by University Health Systems of Eastern Carolina and once again became not-for-profit. It is the only hospital other than PCMH entirely owned by the system. Today, Heritage has 101 acute beds, with 16 for rehab and 10 for skilled nursing.

Heritage's focus is as a community hospital. Its primary care and acute-care services are supported by local physicians, the Brody School of Medicine, the Greenville community, PCMH, and University Health Systems. Radiology, anesthesia, and other services have a tie to the system, but one of the most important specialized areas is the hospital's cancer center. A University Health Systems physician visits once a week, but the clinic is open every day under his direction. A skilled nursing unit and rehabilitation services allow patients to recover from surgery without leaving the hospital and to obtain extensive physical rehabilitation without moving to a nursing or assisted living facility.

Martin General Hospital, Williamston (Martin County). Just north of Greenville lies Martin County, where Martin General Hospital serves a highly rural and traditionally underserved population, preserving critical hospital services while reaching into the community with programs that meet residents' special needs. Like most of the eastern counties, Martin County has large numbers of Medicaid and Medicare recipients, and many uninsured patients. In order to do more with less, it has called on staff members to become multifaceted organizers who can address many diverse demands.

The hospital is managed by Community Health Systems (CHS), based in Brentwood, TN, and is the only for-profit hospital in the region (although Washington County Hospital in Plymouth is also managed by CHS). In 1998, county commissioners, unable to finance a small, rural hospital, leased it for 30 years to CHS for \$17 million, half of which was to be paid over the first four years for capital improvements. In 2001, CHS invested \$2.2 million in

renovations and expansions of the 49-bed hospital. Despite its small size, Martin has many progressive services, including the first water-birthing capability in ENC. It has a full-time radiologist, CT and nuclear medicine, and a mobile MRI. Oncology chemotherapy and cardiology services are provided by visiting specialists. In Summer 2001, an orthopedic surgeon and two podiatric surgeons joined the staff.

A number of specialized programs help provide specialized health care to outpatients. A balloon-ablation procedure helps some women with menorrhagia who would otherwise be candidates for hysterectomy. There is a Coumadin-monitoring clinic and a diabetes clinic, and a program that allows patients to self-administer Heparin at home. In 2000, a pharmacy program brought about \$250,000 in prescription drug assistance to elderly and poor patients.

Beaufort County Hospital, Washington (Beaufort County). The approach to Washington along NC 17 provides a panoramic view of the Pamlico River heading to the sound. This historic town, a cultural focus for the East, has preserved its coastal character while fostering strong ties outside and progressive undertakings within. It now has 10,000 residents and a highly developed medical community.

Beaufort County Hospital, which has 142 beds, opened in 1958 as a Hill-Burton hospital. A \$13 million, multi-phase expansion in progress will increase the radiology area, reconfigure the labor and delivery area, and redesign the front entrance. One component of the expansion, the Lifestyles Medical Fitness Center, opened in February, 2001. It focuses on wellness education, rehabilitation, and physical therapy, with resistance-weight equipment, an aerobics room and Olympic-sized lap pool, as well as a therapeutic pool.

Beaufort County Hospital offers general, thoracic, and vascular surgery; psychiatric services; physical therapy; oncology services; and disease management through a visiting specialist from the Brody School of Medicine. Each year, the hospital's orthopedic surgeon performs about 80 major joint replacements, including hip and knee joints. Advanced diagnostics include nuclear medicine, ultrasound, and arterial radiography. There is a mobile MRI, but permanent MRI capability will be added during the present renovations.

Pungo District Hospital, Belhaven (Beaufort County). Belhaven, another gem of eastern North Carolina, lies at the confluence of Pungo and Pantego creeks, leading to the Pamlico Sound. Traditionally a fishing and farming village, the town sits among the Pocosin Lakes and Alligator River National Wildlife Refuges, unmatched for rare and primitive nature. It is home to the Pungo District Hospital, a 49-bed institution with a remarkable view of Pamlico Sound but immersed in instability, controversy, and financial loss. The hospital serves eastern Beaufort County and the remote Hyde County, which has no incorporated townships and only one doctor's office.

In August 2001, Pungo District Hospital filed for Chapter 11 bankruptcy protection after failing to reach an agreement with University Health Systems. The hospital and UHS cooperate in many areas, and this is expected to continue, according to hospital administrators. Still, the hospital is seeking a partner to ensure its long-term survival. Federal debt protection will allow the hospital to review its finances and form a strategy to reorganize and continue operations. The hospital is also seeking Critical Access designation, a step opposed by one of Belhaven's longstanding physicians, who also serves as mayor.

Despite its difficulties, Pungo District Hospital is taking steps to ensure medical care for the fishermen, small businessmen, and poor who constitute most of its patients. In 2001, the hospital hired its first pediatrician, along with an obstetrician (they are a married couple). The hospital provides diagnostic imaging, including ultrasound, CT scan, and mammography, and physical and speech therapy. There are outpatient clinics in cardiology, orthopedics, and nephrology to serve the heavy concentration of elderly and pediatric patients, but the nationwide shortage of nursing and other health-care providers severely stresses this small, strapped hospital.

Many signs indicate the hospital's chance of succeeding. A recent \$800,000 grant from the Kate B. Reynolds Foundation will help complete renovations and buy desperately needed equipment. Discussions continue with the Brody School of Medicine to open a same-day surgery service for minor procedures. The hospital has a long-term ventilator unit, to treat people who require careful supervision and specialized care while recovering from serious respiratory conditions. Because of its focus on ventilator support, the hospital often admits patients from across North Carolina and Virginia.

Washington County Hospital, Plymouth (Washington County). Washington County, lying along Albemarle Sound, features long, green stretches of forests, fields, and undeveloped areas. In Plymouth, the 49-bed Washington County Hospital sits by the Roanoke River not far from its associated hospital, Martin General in Williamston. Both hospitals are managed by Community Health Systems, although Washington General is county owned. The hospital provides non-invasive cardiology, nuclear medicine, echocardiography, Holter monitoring, and stress testing. Medical oncology services (including chemotherapy) are available, and the hospital has three general surgeons.

The hospital is trying to reach out to widely dispersed residents among the communities of Creswell and Roper and along isolated crossroads. One goal is to establish a clinic in southern Washington County. The hospital has steadily updated equipment, expanded emergency and radiology services, including a new spiral CT scanner. It has recruited two podiatrists and a doctor of osteopathic medicine.

The South and Southern Coastal Area

In this eight-county area, Craven, Carteret, Onslow, Lenoir, Wayne, and Duplin counties have hospitals; Jones and Pamlico counties do not. The burgeoning communities of New Bern and Morehead City are the region's traditional health care leaders because of their solid advances into specialty care. To the west, the land becomes sandier and flatter and the communities more remote. The area also includes the dense woods, rich wetlands and freshwater lakes of the Croatan National Forest and Hoffman Forest. Three military bases are located here: Cherry Point Marine Corps Air Station in Carteret County, Camp Lejeune Marine Base in Onslow County, and Seymour Johnson Air Force Base in Wayne County. As elsewhere in the East, high numbers of Hispanic patients have placed special demands on small hospitals in this largely underserved and economically disadvantaged area. Hospitals are responding by hiring translators and medical staff who can communicate in Spanish.

Craven Regional Medical Center, New Bern (Craven County). One of the state's oldest towns, New Bern was settled by German and Swiss immigrants in 1710. Because it was the colonial state capital, it is home to the gracious, Georgian-era Tryon Palace, former residence of the royal governor and listed in the National Register of Historic Places. New Bern has become a desirable destination for retirees from all over the US, who bring increased financial support to the hospital and the area. Their high expectations for culture, medical care, and services have helped New Bern to grow and develop.

When the state first approved building the hospital, Craven County's population was not large enough for 100 beds, so adjoining rural Jones and Pamlico counties were added to its service area. Craven County Hospital opened in 1963, and has steadily pursued medical advances, supported by solid resources and a strong physician community. Today Craven Regional Medical Center has one of the heaviest investments in technology in the region, with strong points in radiation oncology, open-heart surgery, and acute care.

Craven Regional Medical Center has 313 beds, two linear accelerators, including one capable of intensity-modulated radiation therapy (IMRT), and a multi-leaf collimator that aims at the cancerous tumor while protecting the tissue around it. It has two MRI and two CT scanners. Among its state-of-the-art cardiology services is intracoronary radiation. After angioplasty or stent insertion, a radioactive bead is placed in the newly cleared area, in hopes of deterring reocclusion.

Craven Regional Medical Center participates in the Eastern Carolina Cancer Coalition, which focuses on colorectal and skin cancers. In the Coalition, organizations from Carteret, Craven, Pitt, Beaufort, and Jones counties collaborate to determine effective ways to identify and treat

these diseases. For the past six years, the hospital has offered free skin cancer screening.

Carteret General Hospital, Morehead City (Carteret County) Just 30 years ago, medical care on the coast was scarce and specialty treatment unheard of. This was the norm in communities like Morehead City, a fishing and port village that served its summer vacation population with the same thin resources available to year-round residents.

Carteret General Hospital shows how life on the coast has changed. The 117-bed hospital has a consistently high census (85–90% of capacity), which creates a severe shortage of bed space. Beds line the hallways, and departments like radiology are cramped with equipment and have tiny working areas. Emergency admissions sometimes must wait eight, ten, or twelve hours for a bed. This remarkable growth comes in part from a surge in permanent residents, thanks to the city's desirability for retirees as well as new business. Completion of \$6.4 million in building improvements will triple the size of Carteret's Emergency Department, provide new registration space, and expand patient account and medical records areas. A \$6 million request, expected to receive approval, will allow the hospital to build 34 private rooms. This will not increase the number of beds, but it will allow temporary doubling of patients in the future if more beds are approved.

Services at Carteret General include non-invasive cardiology through an arrangement with the Brody School of Medicine, which supports the program through recruitment and referral assistance, and full radiology including MRI, CT and nuclear medicine. One of the most remarkable aspects of the hospital's growth is its sophisticated specialty services, especially in oncology. Patient visits to the Raab Specialty Clinic, named for the late ECU oncologist Spencer Raab, MD, who brought cancer treatment to the area, increased by 58% during 2000. Radiation oncology use is much higher than projected, in part because of the new linear accelerator, with simulator, which treats 24 to 30 patients a day, compared to the six to 12 patients expected.

Carteret General dedicates many resources to the community, including a unique "CPR Blitz" once a year. This program provides half-day training for certification in basic CPR to the public, free of charge, on a walk-in basis. There are also many support groups, including ones for cancer, stroke, fibromyalgia, diabetes, and pulmonary disease.

Onslow Memorial Hospital, Jacksonville (Onslow County). It would be hard to find an institution facing as many complexities as Onslow Memorial Hospital. It is a civilian hospital in a military town; the previous CEO left office, leading to a complete turnover of the hospital's governing authority; and there has been a nearly complete turnover in the county's commissioners. With 133 beds, this mid-sized institution serves the southern coast, including Jacksonville,

home to Camp Lejeune, site of the Marine Corps Expeditionary Forces in Readiness and the nearby New River Air Station. This 151,000-acre base houses the largest Marine expeditionary force in the world. The hospital also serves Topsail Beach, and the quaint communities of Sneads Ferry, Swansboro, and Richlands.

Camp Lejeune's own 240-bed hospital competes with Onslow Memorial for employees by offering generally higher pay and less on-call and emergency duty. A major deployment of Marines can remove most or all of the base's medical professionals, leaving Onslow Memorial to care for a sudden surge in patients.

The hospital's biggest challenge has been to recuperate from the bad publicity that rocked its administration in 2000. The CEO was fired in February for having awarded questionable contracts to "consultants" for unperformed work and. The following August, the 17-member hospital authority was dissolved by the county commissioners. Then in November 2000, four of five sitting commissioners were defeated at the polls. The turmoil extracted a heavy toll, both in finances and in trust, but the hospital is piecing together a strong recovery. A \$17 million loss in 2000 decreased to \$2–3 million in 2001, after administrators reassessed many operations. The hospital examined its satellite offices, closing eight in the past year. One, an urgent-care clinic, was losing about \$60,000–\$70,000 a month. The hospital stopped providing inpatient dialysis, which was losing \$1.2 million a year. New developments have brought a new neonatal transport unit, capable of transporting desperately ill and underweight babies to Onslow Memorial, the only hospital besides Pitt Memorial with a neonatal intensive care unit (NICU). Teenage pregnancy is also a big health focus. With 140 to 160 deliveries a month, many to very young mothers, the NICU is one of the hospital's core services.

The hospital has a Level II trauma center that offers medical oncology through a satellite agreement with Pitt Memorial. Its rehabilitation center, expanded from six to 26 staff members, is now one of the hospital's strongest services. New initiatives, in addition to a more careful contract review process, include five- and 10-year plans to develop a positive work culture and increase physician recruitment.

Onslow must consolidate and streamline its services to remain financially stable, but the hospital has a firm commitment to the people it serves and will concentrate on being a strong community hospital in the upcoming years.

Duplin General Hospital, Kenansville (Duplin County). This far southern county is one of the most beautiful agricultural areas of the state, with its neat, flat cotton and tobacco fields that stretch unhindered. Hog farming, turkey farming, and mills also contribute significantly to the economy of the county, which is one of the largest. Its 815 square miles are all connected by two-lane, state roads. Kenansville has a population of 1,000 (fewer than some of its employers) that

swells to 6,000 when people come to town for work, business and health care.

Duplin County reflects the changing face of the state's rural areas. The population is one-third white, one-third black, and one third Hispanic (largely migrant workers). Spanish translation services are standard at the 101-bed hospital. Much of the hospital's medical staff comes from other nations under the J-1 visa waiver, which allows rural, underserved counties to recruit foreign physicians who have completed medical training and do not yet wish to return to their home country. This has allowed Duplin to hire highly qualified primary care physicians, and increase the overall availability of care.

Duplin General opened in 1955 and added a nine-bed ICU in the 1970s. In 1989, following a community survey that showed that 94% of residents felt the hospital was very important, the hospital added 55,000 square feet, nearly doubling its size. New surgical services were added, as well as a new emergency room, new women's center, new administration offices, new lobby and new medical records area, all completed in 1995. Facing the same stresses as other small, rural hospitals across the nation, Duplin General has maintained a strong financial situation, with \$1.5 million in positive revenues for 2000. Its capital needs for the 2000-2001 year were \$1.85 million, some of it provided through the hospital's foundation.

In 1965, the hospital had only eight staff doctors, but by 2001, through aggressive recruiting, it had more than 25, including a dramatic increase in primary care physicians. At the same time, the hospital arranged for specialty services through courtesy and consulting privileges with doctors from outside the area. Non-invasive cardiology is provided through the medical school and gastroenterology by a visiting physician. The hospital-owned Gateway Physicians Group, and two government-funded clinics, Goshen Medical Center and Duplin Medical Association, help bolster primary care services. The Brody School of Medicine has also support recruitment efforts by bringing the community to the attention of doctors in training.

One of the most important jobs for Duplin General is maintaining a positive bottom line in a time of shrinking federal program dollars. Medicare and Medicaid patients form about 65% of the hospital's patient base. The county's large industries and the insurance coverage their employees bring to the hospital are a vital part of the hospital's ongoing financial success.

Lenoir Memorial Hospital, Kinston (Lenoir County). For many years Kinston's airport played a key role in bringing people to eastern North Carolina and Lenoir Memorial, a 281-bed hospital, today sits on Airport Road. From 1906, when the Robert Bruce McDaniel Memorial Hospital opened, the hospital advanced into a 50-bed center, which until 1932 included the Parrot Memorial Hospital School of Nursing.

Memorial General Hospital opened in 1925, and was purchased in 1950 by Lenoir County. The present hospital opened in 1973.

The hospital offers a wide and diverse range of services, including a Cancer Center, a Day Surgery Center, a 46-bed skilled nursing (transitional care) unit, Family Birth Center and Diabetes Center. A \$15 million construction project, set to conclude in Spring 2002, will double the size of the emergency department and lobby, the highest-traffic area. The hospital performs cardiac catheterizations and has a cardiac rehabilitation program. There is a focus on medical and radiation oncology, including brachytherapy, and the hospital participates in FDA Phase III clinical trials in radiation oncology.

Advanced services are part of Lenoir's emphasis on serving as a community hospital. Its service area includes Greene and Jones counties, both without hospitals. Lenoir has begun an ongoing drive for good relationships with patients—what retailers call customer service. Making sure patients feel well taken care of includes ensuring their pain receives attention and appropriate treatment. It also includes courtesy, food quality, and comfort. In an ongoing customer service campaign, Lenoir administers patient satisfaction surveys in the ER, inpatient, outpatient, and extended care units. In 2000, Lenoir was one of three hospitals in the state (along with Gaston Health Services and Carolinas Medical Center) to receive Ralph E. Snyder, MD, Merit Awards in Health Care Quality Improvement, from Medical Review of North Carolina for Medicare Consumers.

Financially, the hospital has maintained a solid position, unusual in that about 70% of its revenue comes from federal programs. This means dealing with fixed reimbursement for services, which makes efficiency very important. Hospital policy requires maintaining a balance in cash and investments to ensure a consistent source of investment income to supplement revenues, which, say hospital administrators, is key to their success.

Wayne Memorial Hospital, Goldsboro (Wayne County). This hospital is not only one of the largest but also one of the oldest in eastern North Carolina. In 1895, a group of ministers, physicians, the Ladies Benevolent Society, a newspaper editor, and county leaders raised funds to open a hospital, which was dedicated in early 1896. It opened above a livery stable, with an older couple serving as nurse and orderly. Physicians donated their services and money for medicine, dressings, and equipment. Records indicate that there was only one paying patient during its first year. It was renamed Goldsboro Hospital in 1903, and moved in 1905. By the mid-1940s, there was a need for more space for an increasing number of patients; after a new renovation, it opened as Wayne County Memorial Hospital in 1952. In 1986, Wayne Memorial re-organized as a non-profit institution separate from the county, one of the first in the state

to do so. (Wilson County Hospital became a private, non-profit institution in 1986, as well.)

With 316 beds, Wayne Memorial is about the same size as Wilson Memorial and second only to Pitt County Memorial. It offers a number of advanced services in terms of technology and staff training, but its emphasis is on personal service.

The hospital has a wide scope of advanced services, including heart catheterization, medical oncology (including FDA Phase III clinical trials), MRI and CT scanner, mobile lithotripsy, and a wellness center. In Goldsboro, a private linear accelerator is available. One of the newest additions at Wayne Memorial is a gamma camera with advanced software for nuclear medicine. It will be used for cardiology services, cancer treatment and other areas.

The hospital is a strong participant in its community. It presently funds the director for the school nurse program, and the program director for a mobile medical office (a specially equipped van, which goes into underserved communities to offer health care for the uninsured). The latter project, known as "Wayne Action Teams for Community Health," supported by funds from the Duke Endowment, is staffed by a physician's assistant or nurse practitioner. There is no charge for care, although patients must prove that they lack commercial insurance or Medicaid or Medicare coverage.

Although the hospital is still located at its 1912 location, ongoing building projects continue to expand and modernize it. Most recently, the hospital refurbished its patient care areas and is concluding a renovation of its sixth and seventh stories. Such growth will require careful planning, as labor costs rise and reimbursement remains fixed or declines over the next few years.

Throughout eastern North Carolina, this hospital and others that serve this diverse region of the state are looking into an unpredictable health care future. Each must meet the challenge of offering modern, efficient, and effective care without losing touch with its distinctive communities.

Acknowledgments. Special thanks to the hospitals who provided information for this article, with special appreciation to the Office of News and Information, University Health Systems of Eastern Carolina and the Brody School of Medicine, Tom Fortner, director; the Brody School of Medicine; East Carolina University Center for Health Services Research and Development, Christopher Mansfield, Ph.D., director; and the North Carolina Hospital Association. Special gratitude is due to the hospitals' public relations, marketing and information offices and to the executives of the hospitals of eastern North Carolina.



SINCE CHRIS KLUG'S KNEE SURGERY, IT'S ALL BEEN DOWNHILL. FAST.

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Hospital Care in Eastern North Carolina 1974 and 2000

1974

3066 Beds

24 hospitals in 19 counties

10 counties without hospitals

2000

3231 Beds

21 hospitals in 19 counties
(Dare Co. to open, 2002)

10 counties without hospitals
Closed: Tyrell Co. Hospital, 29 beds; Robersonville Township Hospital, 12 beds; Sea Level Hospital (Duke University link), 72 beds; Rocky Mount Sanitarium, later Community Hospital, 43 beds.

Open-heart surgery
Pitt Co. (1984), Craven Co. (1994)

Diagnostic catheterization
Pitt Co. (including pediatric services), Craven, Nash, Wilson, Lenoir, Onslow, Wayne, Pasquotank (Albemarle Hospital)
Mobile unit at Hertford (Roanoke-Chowan Hospital)

Bone Marrow Transplant
Pitt Co.

Solid Organ transplant
Pitt Co.

Lithotripsy (mobile units)
Beaufort Co., Pitt, Craven, Wayne, Edgecombe (Heritage Hospital), Lenoir, Wilson, Carteret, Onslow, Halifax, Pasquotank (Albemarle Hospital)

Radiation Oncology
Lenoir Co., Wayne, Craven, Carteret, Nash, Halifax, Wilson, Pitt, Pasquotank (Albemarle Hospital)

Fixed MRI
Onslow Co., Carteret, Craven, Lenoir, Wayne, Wilson, Pitt, Nash, Pasquotank (Albemarle Hospital), Beaufort

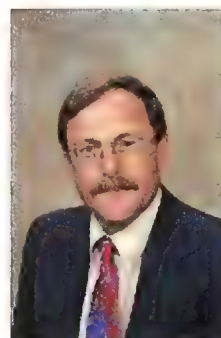
Source: Division of Facility Services, North Carolina Department of Health and Human Services

Dr. Athanasius Anagnostou, former Chief of Hematology/Oncology (1994-2001) at Brody School of Medicine, East Carolina University, wishes to publicly express his gratitude to the Division's Faculty and Staff for their extraordinary commitment to the highest standards of cancer care, teaching, and public service, which has brought the mission and vision of our medical school into practical reality for much of the region.



Mary J. Raab, MD (1977-present)

Co-founder of the program with her late husband, Spencer Raab, she remains keeper of institutional memory, defender of core educational and care principles, and moral compass for our programmatic directions. A unique role model of a compassionate, talented clinician for our students, nurses, and house-staff.



Charles L. Knupp, MD (1983-present)

An exemplar of the very best amongst ECU faculty, a quiet, loyal, selfless, methodical, administrator and clinician, regionally admired for compassionate and efficient care, immense knowledge and experience. He has more than anybody else been responsible for the survival, growth, and maintenance of the program.



James Leonardo, MD, Ph.D (1996-present)

A towering figure (6' 8") with passion and recognized talent for teaching and good clinical care.



Terrance Comeau, MD (1996-present)

The founding director of a stem cell and bone marrow transplantation program recognized regionally for compassionate care and outstanding clinical outcomes.



Pamela Lepera, DO (1996-present)

Pamela has used her extensive clinical knowledge, immense energy, and enthusiasm, for the local provision of quality cancer care of regional patients (at Jacksonville, Rocky Mount and Greenville).



Lyndon Jongun Kim, MD (1997-2001)

A Massachusetts General Hospital-trained neuro-oncologist, Lyndon helped Onslow Memorial Hospital build a quality oncology program, established a regional Brain Tumor Clinic at the Leo Jenkins Cancer Center, and has returned to his research pursuits at the National Cancer Institute.



Darla K. Liles, MD (1998-present)

An exceptionally talented and federally funded expert on coagulation disorders, she has been generously assisting three other major programs (the clinical trials office, the breast cancer program and outreach).



Jennie Robertson Crews, MD (1998-present)

The medical director of the Beaufort County Hospital Oncology Program has been recognized as a leading breast cancer expert in the region.



Anastas Provatas, MD (1999-present)

The medical director of the Carteret General Hospital Oncology Program, has expanded the locally provided services to include access to quality clinical trials.



William F. Bobzien, III, MD (1997-present)

A leader of the Rocky Mount medical community, a man of high purpose, immense good will, and humble heart, Bill has often interrupted his retirement to selflessly assist our programs and other regional oncologists and their patients.



George Sigounas, Ph.D (1994 – Present)

A talented laboratory scientist, he has developed a state of the art Stem Cell Processing Lab for our transplantation program.



Kenneth S. Karb, MD (2001 – present)

A leader in cancer care in Greensboro and a strong advocate for cancer control at the state level, he now shares his vast clinical experience with our medical students and house-staff.



Walter Quan, Jr., MD (2000-present)

A talented clinical trialist with a warm and engaging personality, Walter was recruited to develop a regional program in Biotherapy and Immunotherapy.

Adesola A. Awomolo, MD

(2001-present)

As the new medical director of oncology at Onslow Memorial Hospital, she will maintain and improve the quality of care available to local cancer patients.

Marvene Weigand, BS, MAEd, RN

(1983-present)

A nurse's nurse, head of our outpatient clinic at the Leo Jenkins Cancer Center, she has stood for the best possible care for all patients at all times and has shared her immense experience in oncology nursing with our regional partners.

Valeria George (1977-present)

The administrative assistant of the Hematology/Oncology Program since its inception, she exhibited the most remarkable loyalty to our division and its people, and provided the essential administrative continuity for the development and maintenance of the program.

Phyllis DeAntonio, RN, MSN, OCN

The admired Administrator of the Leo Jenkins Cancer Center, a passionate and effective advocate of superb cancer care and cancer control both at our Cancer Center and the state level, Ms. DeAntonio nurtured and supervised the development of our Bone Marrow Transplantation Program (and all other major cancer programs).

The Division's other Staff:

The talent, hard work, loyalty, and compassion of our staff has been a principal factor in the success of the Hematology/Oncology Division in accomplishing a remarkable fiscal turn-around and in earning the number one position in conducted outside surveys on patient and referring physician satisfaction.

Nursing Personnel

Chemotherapy Nurses: Sharon Bell, RN

Leslie Corbett, RN, Diane Mathis

Nurse Clinicians: Sheila Swinson, RN

Teresa Davis, RN, Dawn Jones, RN

Medical Office Assistants: Lorie Edwards, Jeanette Brown

Clinical Laboratory Personnel

Deborah Schneider, Medical Laboratory Technologist

Windy Sammond, Medical Laboratory Technician

Melissa Smith, Medical Laboratory Technician

Administrative Personnel

Catherine Gray, Office Assistant

Delores Bowling, Office Assistant

Gayle Rowell, Office Assistant

Kathy Phelps, Office Assistant

Susan Butler, Office Assistant

Phyllis Parker, Office Assistant

Amy Coleman, Office Assistant

Melissa Summerlin, Office Assistant

Melissa Rhodes, Clinical Administrator (1999-2001)

Mary Land, Outreach Program Secretary

Clinical Trials Personnel

Judy Chaplinski, RN

Jackie Bond, Office Assistant

CME Calendar

January 11-12

Newer Concepts in Age Management: 3rd Annual Better Aging and Wellness Conference

Place: Sheraton Norfolk Waterside, Norfolk, VA

Credit: 11.5 hours, Category 1, AMA

Fee: \$245 MDs; \$195 non-MDs

Info: Eastern Virginia Medical School Office of CME & Division of Plastic Surgery 757/446-6140; email: evmsmail.evms.edu

January 18-19

Contemporary Approaches to Palliative Medicine

Place: The Mills House Hotel, Charleston, SC

Credit: Up to 12.5 hours, Category 1, AMA; 15.1 hours nursing; 12.5 hours pharmacy

Fees: \$350 MDs; \$300 non-MDs; \$250 MUSC staff

Info: Medical University of SC, College of Nursing, 99 Lucas St., PO Box 250160, Charleston SC 29425

February 4-6

21st Annual Cardiovascular Conference at Snowshoe

Place: Mountain Lodge Conference Center, Snowshoe, West Virginia

Credit: Up to 18.5 hours, Category 1, AMA

Fees: \$460 ACC members; \$535 nonmembers; \$255 non-MDs; \$50 off for registration before 1/21/02

Info: American College of Cardiology, PO Box 79231, Baltimore, MD; Tel 800/253-4636 x694

March 11-15

The Alton D. Brashear Postgraduate Course in Head & Neck Anatomy

Place: Virginia Commonwealth University School of Medicine, Richmond, VA

Credit: 43 hours, Academy of General Dentistry

Fees: \$450 MDs; \$300 residents

Info: Dr. Hugo R. Seibel, Dept. of Anatomy, VCU, PO Box 980709, Richmond, VA 23298-0709

March 15-16

Neurology Update

Place: Hawthorne Inn and Conference Center, Winston-Salem, NC

Credit: Up to 12 hours, Category 1, AMA

Fee: \$150

Info: Sarah Franklin, Office of Continuing Education, 336-716-4450

March 21-23, 2002

Management of Cerebral Palsy

Place: Babcock Auditorium, WFU School of Medicine, Winston-Salem, NC

Credit: up to 20 hours, Category 1, AMA

Fees: \$425

Info: Sarah Franklin, Office of Continuing Education, 336-716-4450

April 5-6

Practical Pediatrics

Place: Babcock Auditorium, WFU School of Medicine, Winston-Salem, NC

Credit: up to 10 hours, Category 1, AMA

Fee: \$150

Info: Sarah Franklin, Office of Continuing Education 336-716-9796

Apr 12-13

3rd Annual Western North Carolina Death Investigation Seminar

Place: Holiday Inn SunSpree, Asheville, NC

Credit: Up to 8.5 hours, Category 1, AMA

Fee: \$125

Info: Sarah Franklin, Office of Continuing Education, 336-716-4450

April 13

Diagnosis and Treatment of Laryngopharyngeal Reflux

Place: Hawthorne Inn and Conference Center, Winston-Salem, NC

Credit: Up to 3.75 hours, Category 1, AMA

Fee: \$90

Info: Sarah Franklin, Office of Continuing Education, 336-716-4450

Classified Ads

BC-BE COMBINED INTERNAL MEDICINE-pediatrics needed full-time in Durham, NC by January 31, 2001 and August 1, 2001. Excellent salary and benefits package. Call Jackie Pollard at 919/768-4297 or 800/678-2811 or send CV to J. Pollard @ Scott Medical Group, 2828 Croasdaile Drive, Durham, NC 27705 or fax CV to 919/382-5156.

BC-BE FAMILY PHYSICIAN needed full time in Durham ASAP. Excellent salary and benefits package. Call 1 - 3. Call Jackie Pollard at 919/768-4297 or 800/678-2811 or send CV to J. Pollard @ Scott Medical Group, 2828 Croasdaile Drive, Durham, NC 27705 or fax CV to 919/382-5156.

BC-BE OB-GYN needed in Ft. Lauderdale, FL. Both clinic and private office work available. Practice includes 8 generalists, 5 specialists (MFM), and 9 midwives. 2,700 deliveries. Call approximately 1:4 (24 hrs, in-house). Midwife supported 24/7. Excellent salary and benefits package. Call Jackie Pollard at 919/768-4297 or 800/678-2811 or send CV to J. Pollard @ Scott Medical Group, 2828 Croasdaile Drive, Durham, NC 27705 or fax CV to 919/382-5156.

BC-BE PEDIATRICIAN needed full time for very busy Pediatric practice in Cary, NC. Prefer further training in Adolescent Medicine. Excellent salary and benefits package. Call Jackie Pollard at 919/768-4297 or 800/678-2811 or send CV to J. Pollard @ Scott Medical Group, 2828 Croasdaile Drive, Durham, NC 27705 or fax CV to 919/382-5156.

BC-BE PERINATOLOGIST (2) needed ASAP in Ft. Lauderdale, FL. Excellent salary and benefits package. Predominantly office-based practice with hospital consults. Offices in Ft. Lauderdale, Boca Raton and Hialeah, Florida. Call Jackie Pollard at 919/768-4297 or 800/678-2811 or send CV to J. Pollard @ Scott Medical Group, 2828 Croasdaile Drive, Durham, NC 27705 or fax CV to 919/382-5156.

ED MEDICAL DIRECTOR: A medical director opportunity is available in the Emergency Department of a community hospital in Laurinburg. The ED sees 24,000 patients a year with a wide variety of cases. Hospital has a separate urgent care facility. Director candidates must be BC in EM, with prior administrative experience preferred. Please call Donna Swider at 800/848-3721 or email donna_swider@teamhealth.com. For more information on the hospital visit www.scotlandhealth.org. Sorry, no J-1 opportunities available.

EMERGENCY PHYSICIANS: Staff opportunities are available in Elizabethtown, Jacksonville, and Lumberton. Annual ED volumes range from 14,000 to 45,000 patients annually.

Lumberton location affiliated with Duke University for support services. All backgrounds considered with ED experience or PGY-3 EM residents for the Elizabethtown facility. Physicians must be BC/BP in EM, IM, or FP for the Jacksonville facility and BC/BP in EM for the Lumberton facility. Please call Donna Swider at 800/848-3721 or email donna_swider@teamhealth.com. Sorry, no J-1 opportunities available.

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POOR CASH FLOW: Is this disease killing your practice? Signs: high receivables, low income. Symptoms: Aging claims over 45 days, chronic claim denials. Treatment: Unique Billing Solutions. (Electronic Claim Submission to All Major Carriers). Unique Billing Solutions takes the claims you've given up on and gets the money you've already earned—FAST. Call 919/931-7240. Email: drea573@aol.com.

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Running the Numbers

A Periodic Feature to Inform North Carolina Physicians and Their Patients

About Current Topics in Health Statistics

Paul A. Buescher, Ph.D., Editor

Screening North Carolina's Low-Income Children for Lead Poisoning, 1998-1999

Lead poisoning impairs children's mental and physical development. Because of relatively high rates of lead poisoning and infrequent screening of children enrolled in Medicaid, the Health Care Financing Administration (HCFA) tightened its policy on lead screening in October of 1998: *All children are considered at risk and must be screened for lead poisoning. HCFA requires that all children receive a screening blood lead test at 12 months and 24 months of age.*

In North Carolina, screening for childhood lead poisoning has historically been done primarily at local public health departments. In 1994, however, the state's lead surveillance program was given a boost when the State Laboratory offered blood lead analysis at no charge for all children less than six years of age. As a result, screening rates more than doubled and continue to increase. Providers other than public health departments are now doing more childhood lead screening.

To examine North Carolina's compliance with the 1998 HCFA policy on childhood lead screening, we calculated the rates at which health departments and private providers screened children aged 1 and 2 covered by Medicaid in 1998 and in 1999. Medicaid claims for Health Check (well-child care) visits were matched to laboratory lead test records obtained from the North Carolina Division of Environmental Health. Record matching was done using the child's name and other personal identifiers.

North Carolina Medicaid Child Lead Screening Rates

Age in months	No. health check children	1998			No. health check children	1999			1998 to 1999		
		% screened total	% screened health dept.	% screened other provider		% screened total	% screened health dept.	% screened other provider	% change total	% change health dept.	% change other provider
9-17	43,261	40.9	63.4	38.0	44,639	47.8	71.9	45.0	16.7	13.3	18.3
18-29	26,415	31.1	56.4	25.9	26,150	38.9	64.7	34.2	25.3	14.9	32.3

Screening rates for children enrolled in Medicaid increased substantially from 1998 to 1999 (17% for children ages 9-17 months and 25% for children ages 18-29 months). Still, in 1999 less than half of these low-income children were screened for lead around the time of their first or second birthday. Rates computed separately for health department and other providers showed that, in general, health departments had higher screening rates, but other providers demonstrated a greater percentage increase between 1998 and 1999.

The improvement in lead screening rates from 1998 to 1999 reflects increased effort by Medicaid providers to incorporate lead screening procedures into well-child care visits. However, we have not reached the goal of screening every one- and two-year-old child enrolled in Medicaid. Lead exposure is still a significant problem in many parts of North Carolina. Continued efforts of both health departments and other providers to increase lead screening will help to improve the health and well-being of low-income children in North Carolina.

Acknowledgment: J. Timothy Whitmire, Ph.D., of the State Center for Health Statistics contributed this article. The full study from which this report was taken is *Statistical Brief No. 22*, January 2001, accessible at www.schs.state.nc.us/SCHS/pubs.

From the State Center for Health Statistics

www.schs.state.nc.us/SCHS

North Carolina Department of Health and Human Services



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therapy and biotherapy. Our specialists also collaborate with physicians in other communities to improve cancer care throughout the region. And because we are part of an academic medical center, our patients have access to clinical trials that offer breakthroughs in treatment before they are available at other facilities.

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The Department of Radiation Oncology congratulates Dr. Anagnostou for a job well done and wishes him good luck at the University of Massachusetts School of Medicine.

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